JANUARY 1998
QUARTERLY SAMPLING REPORT
PHIBRO-TECH, INC.

Santa Fe Springs, California

April 3, 1998

Prepared for:

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Prepared by:

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CDM Project No. 2279-11463-111.REP.REPT

PHIBRO-TECH, INC.

April 7, 1998

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Dear Messrs. Ross, Leach and Kou:

Enclosed is the First Quarter 1998, Quarterly Groundwater Monitoring Report for Phibro-Tech, Inc., Santa Fe Springs facility. The Report includes analytical results and physical measurements obtained January 13 - 15, 1998 from selected monitoring wells at Phibro-Tech. Since this Report includes portions of the RCRA Facility Investigation (USEPA Docket No. RCRA 09-89-0001), this Report is also submitted to EPA.

Based on a technical review by our consultant, Camp Dresser and McKee, a groundwater monitoring program is included which was implemented beginning with the April 1991 groundwater monitoring. Additional wells and parameters changed at the request of EPA are included in this Groundwater Monitoring Report. The changes are described in the Report. Please contact me if you have any questions or comments concerning this Report.

Very truly yours,

E E Vigil

E. E. Vigil
Environmental and Safety Manager

EEV/kn/rwqcbqtgw
Enclosure

cc: see following page

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Section 1
Introduction

This report summarizes the 47th RCRA quarterly groundwater monitoring sampling and analyses period at the Phibro-Tech, Inc. (PTI), Santa Fe Springs, California facility (formerly referred to as Southern California Chemical). Contained herein are the results of laboratory analyses of groundwater samples and water level measurements obtained during the period of January 13 to January 15, 1998.

The purpose of the groundwater sampling program, which began in March 1985, is to determine if hazardous waste constituents are migrating from the facility to the groundwater beneath the site. This is accomplished through the comparison of background or upgradient water quality and groundwater quality beneath the site. Statistically-significant increases in contaminant concentrations between known areas of groundwater contamination and downgradient wells would indicate that migration is occurring. In the past, statistical analysis was performed annually and was included in the July quarterly monitoring reports. Statistical analysis is now conducted each quarter and is included in the corresponding monitoring report. The January 1998 statistical analysis is contained in Appendix E of this report.

To date, three types of contaminants have generally been detected in the groundwater beneath the site: soluble metals (primarily chromium and cadmium), purgeable aromatic organic compounds (toluene, ethylbenzene and total xylenes) and purgeable halogenated organic compounds (i.e., solvents, primarily trichloroethene [TCE]). Groundwater modeling completed in January 1993, and groundwater monitoring conducted since 1985, indicate that the purgeable aromatic plume originated upgradient from the PTI facility. The distribution of TCE appears to be ubiquitous, however, somewhat elevated concentrations exist in the vicinity of Pond 1, a RCRA-regulated former surface impoundment area. Elevated concentrations of soluble metals have also been consistently detected in the vicinity of Pond 1. Soluble metal concentrations at the downgradient property line and in deeper wells, however, continue to be negligible to non-detect.

More than 10 years of quarterly groundwater monitoring at the PTI facility has indicated a general lack of hexavalent chromium migration. During groundwater modeling performed by CDM in 1993, a retardation factor of 50 was selected based on the observed distribution of hexavalent chromium in the groundwater. Previous data analysis indicated that the most likely basis for the relatively high (but within the range of reasonable and appropriate values) retardation factor would be the existence of reducing conditions in the saturated zone, promoting the conversion of hexavalent chromium to trivalent chromium (Cr^{3+}). Trivalent chromium, having a very low solubility in water, would tend to precipitate and sorb to the soil, limiting migration. During four quarterly sampling events conducted in 1996, additional laboratory analyses (iron and redox potential) were performed on groundwater samples collected from wells MW-04, MW-09, and MW-14S. These additional data, along with the pH, total chromium, and hexavalent chromium data, provided a better understanding of the mechanisms controlling chromium migration in groundwater underlying the facility and supported the above hypothesis. Please refer to Section 6.4 (Chromium Fate and Transport) of the October 1996 Quarterly Sampling Report for a detailed discussion of this conclusion.

In addition to the data obtained during the January 1998 sampling, this report contains tables listing detection limits of the parameters analyzed (Appendix A). Copies of the original laboratory results are included in Appendix B. Chain-of-custody records for the January 1998 sampling are included in Appendix C. Appendix D contains background groundwater concentrations of contaminants for the Santa Fe Springs area for the year 1996. Appendix E contains the complete quarterly statistical analysis.

Prior to October 1993, quarterly reports have included analytical result summary tables from all previous sampling rounds. Starting with the October 1993 quarterly report, historical water quality data tables are no longer included in the report as an appendix. Please refer to Appendix B in the July 1993 Quarterly Sampling Report for a summary of historical groundwater analytical data. A summary table of key historical results since January 1989 is provided as Table 6-1 in this report.

Section 2
Monitoring Well Sampling

Groundwater sampling, utilizing existing on-site monitoring wells, was conducted by CDM personnel during the period of January 13 to January 15, 1998. Field activities were performed in general accordance with the groundwater sampling protocol as outlined in Section 4.3.3 of the approved RCRA Facility Investigation (RFI) Work Plan (CDM, June 1990). Prior to the submittal of the RFI Work Plan for regulatory agency review and approval, the J.H. Kleinfelder and Associates (Kleinfelder) Quality Assurance Project Plan (QAPP, May 1988) was used as the primary groundwater sampling guidance document. Proposed deviations from the RFI Work Plan (i.e., well purging using a submersible pump and sample collection using disposable bailers) were discussed in October 1994 correspondence to the DTSC. These changes were implemented during the October 1994 and all subsequent sampling events.

Twenty-four monitoring wells exist on-site. The locations of these wells are shown on Figure 2-1. One well, MW-06A, historically has not been sampled for groundwater analysis because it is screened in the Gage Aquifer, which is unsaturated below the PTI facility. The remaining wells are screened in the Hollydale Aquifer; 16 in the upper portion and seven in the lower portion of the aquifer.

Beginning in February 1985, Kleinfelder initiated groundwater sampling, utilizing monitoring wells MW-01 through MW-06B. Six additional wells (MW-04A and MW-07 through MW-11) were installed at the site in July 1985, thereby increasing the total number of active wells to 12. Quarterly sampling of the 12 wells was initiated in March 1986.

Commencing with the January 1989 sampling event, CDM has been responsible for all groundwater monitoring activities at the facility. Ten wells (MW-01D, MW-06D, MW-12S, MW-12D, MW-13S, MW-13D, MW-14S, MW-14D, MW-15S and MW-15D) were constructed as part of the first phase of the RFI program and were first sampled during the October 1990 sampling round.

Groundwater analysis of the 22 wells which existed during the RFI program from October 1990 to January 1991, indicated that the number of wells sampled could be reduced and yield comparable results to sampling all the wells. During the April, July, and October 1991, and January 1992 sampling rounds, the 11 wells sampled included 8 wells (MW-01S, MW-03, MW-04, MW-07, MW-09, MW-11, MW-14S, and MW-15S) screened in the upper portion of the Hollydale Aquifer and three wells (MW-01D, MW-04A, and MW-15D) screened in the lower portion of the Hollydale Aquifer.

Beginning with the April 1992 sampling round, three additional wells (MW-06B, MW-06D, and MW-16) were included in the quarterly monitoring program, bringing the total number of sampled wells to 14. A new well, MW-16, constructed in March 1992 as part of the Phase II RFI program, was sampled for the first time during the April 1992 sampling round. The same 14 wells have been sampled during all subsequent sampling rounds. On several occasions, additional laboratory analyses have been performed and additional wells included in quarterly sampling, at the request of the U.S. EPA. Additional analyses and wells are noted in the comments column of Table 2-1, which summarizes the groundwater monitoring program at the site.

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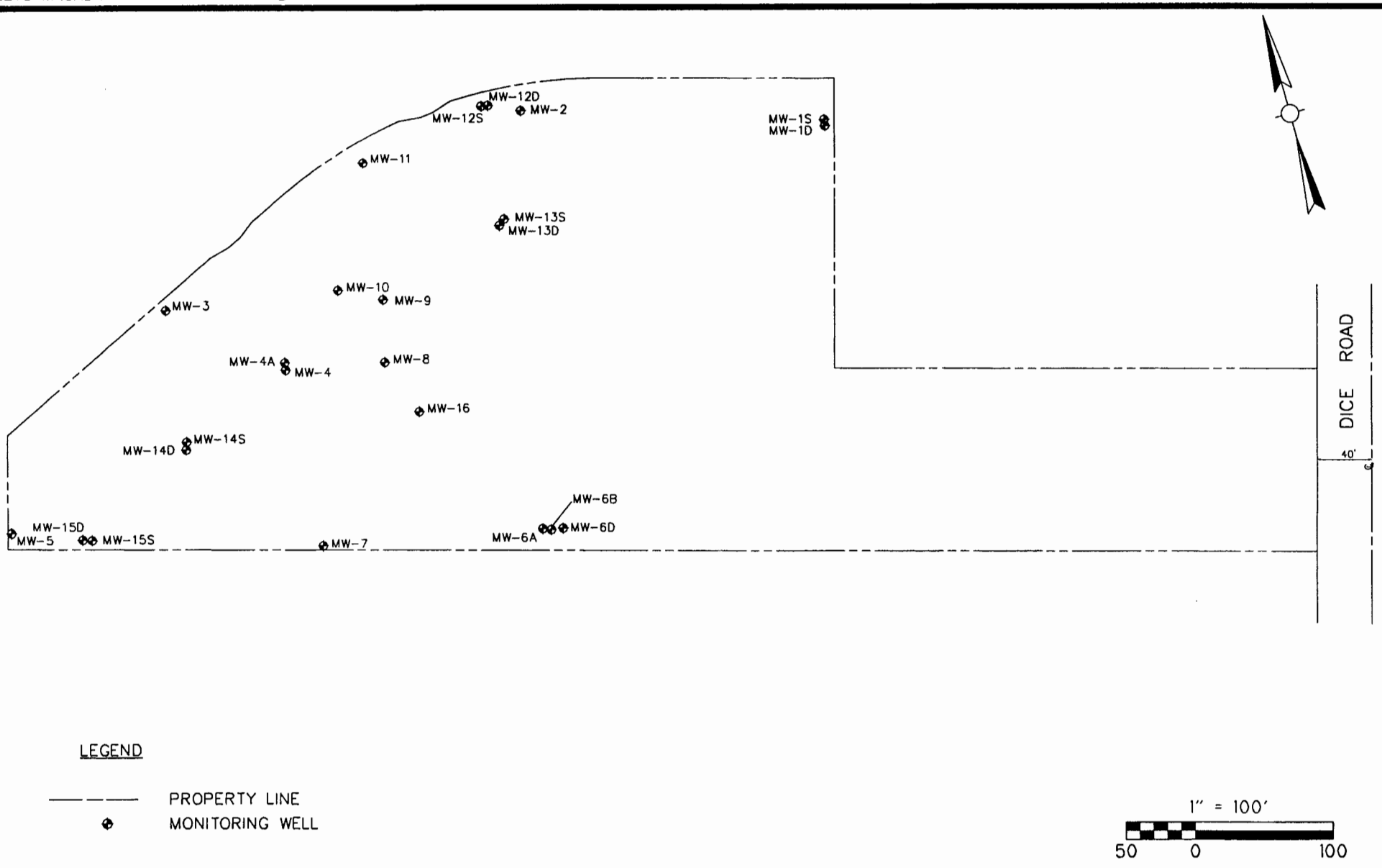

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

MONITORING WELL LOCATION MAP

CDM
environmental engineers, scientists, planners, & management consultants

Figure 2-1

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
3/85	Quad	Cu & Zn	X	X	X	--	--	Sampled wells MW-1, 2, 3, 4, 5, & 6B. Sulfide, nickel, copper and zinc requested by DOHS and RWQCB. Also Appendix III parameters and water quality parameters (see footnote).
7/85	Quad	Cd, Cr	X	--	X	--	--	Sampled wells MW-4A, 7, 8, 10 and 11
3/86	Quad	Cu & Zn	X	X	X	--	--	Sampled 12 wells (MW1, 2, 3, 4, 4A, 5, 6B, 7, 8, 9, 10 & 11). Also Appendix III parameters and water quality parameters (see footnote).
7/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
9/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
12/86	Quad	Cd, Cr, Cu, Zn	X	X	X	624	--	Sampled all 12 wells (as previous)
3/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Sampled 11 wells, not 4A
7/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event
10/87	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
2/88	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After July 1987, all 12 wells were sampled during each event
6/88	X (not Quad)	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis (t-test) on Indicator Parameters (IPs).
9/88	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	IPs & volatile organics from MW1, 2, 4A, 5, 6, 7 analyzed semi-annually in June/Dec.
1/89	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	After Jan. 1989, volatile organics analyzed for all 12 wells.
4/89	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
7/89	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis of Jan. thru July 1989 data (IPs, total and hexavalent chromium).
10/89	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
1/90	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
4/90	--	Cd, Cr, Cu, Zn	X	X	X	601/602	--	
7/90	Quad	Cd, Cr, Cu, Zn	X	X	X	601/602	--	Performed statistical analysis of Jan. 1989 data (IPs, total and hexavalent chromium).
10/90	--	Cd, Cr, Cu, Fe, Ni, Pb, Zn	X	X	X	601/602	X	Sampled 22 wells, Appendix IX parameters analyses were performed on wells 4, 4A, 6B, 6D, 12S, 12D, 15S, 15D, plus a duplicate of 4.
1/91	Quad	Cd, Cr, Cu, Fe, Ni, Pb, Zn	X	X	X	601/602	--	Sampled 22 wells.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
4/91	pH	Cd, Cr, Cu	X	--	--	601/602	--	New sampling program was initiated. Sampled 11 wells including wells MW-01S, MW-01D, -03, -04, -04A, -07, -09, -11, -14S, -15S, -15D.
7/91	pH	Cd, Cr, Cu	X	--	--	601/602	--	Performed annual statistical analysis.
10/91	pH	Cd, Cr, Cu	X	--	--	601/602	--	
1/92	pH only (all) TOC only (MW-01 & -04)	Cd, Cr, Cu	X	--	Ammonia as nitrogen (MW-01 & -04)	601/602	--	Ammonia & TOC analyses added at MW-01S and MW-04.
4/92	pH only TOC only (MW-01 , -04, -09, -14S)	Cd, Cr, Cu-all see coments	X	--	Ammonia as nitrogen (MW-01, -04, -09, -14S)	601/602	EDB (MW-04) TPH (W-16)	Sampled 14 wells including Wells MW-01S, -01D, -03, -04, -04A, -06B, -06D, -07, -09, -11, -14S, -15S, -15D, -16. Additional analysis as part of Phase II RFI; unfiltered metals on MW-04S and -14S. Pb and Ni on wells 1, 4, 14S, 15S, 16; Fe, Zn on well 16.
7/92	pH	Cd, Cr, Cu	X	--	--	601/602	--	Sampled 14 wells. Performed annual statistical analysis.
10/92	pH	Cd, Cr, Cu	X	--	--	601/602	--	Sampled 14 wells.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells.
4/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells.
7/93	pH	Cd, Cr, Cu	X	--	--	8010/8020 (TVPH, TEPH)	--	Sampled 15 wells. (MW-13S was added) TVPH and TEPH analysis on MW-09, 13S, and 16 only. Performed annual statistical analysis.
10/93	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 15 wells (MW-13S not analyzed for metals and pH) TVPH & TEPH analysis on MW-04, 07, 09, 13S, and 16 only. Performed statistical analysis.
1/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
4/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis
7/94	pH	Cd, Cr, Cu	X	See comment	--	8010/8020	--	Sampled 14 wells, chloride and sulfate analyses on MW-04, MW-09, MW-14S, MW-15S, MW-15D, and MW-16. Performed statistical analysis
10/94	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
4/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
7/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
10/95	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
1/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis. 1995 Annual Report included as Appendix F.
4/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
7/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis.
10/96	pH	Cd, Cr, Cu	X	--	--	8010/8020	--	Sampled 14 wells Performed statistical analysis. 1996 Annual Report included as Appendix F.

TABLE 2-1
PHIBRO-TECH, INC.
Groundwater Monitoring Program Summary
(continued)

Sampling Event	Indicator Parameters	Trace Metals	Hexavalent Chromium	Chloride	Nitrate	Volatile Organics	Appendix IX	Comments
1/97	pH	Cd, Cr, Cu	X	--	--	8260, MTBE	--	Sampled 14 wells Performed statiscal analysis.
4/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
7/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis.
10/97	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. 1997 Annual Report included as Appendix F.
1/98	pH	Cd, Cr, Cu	X	--	--	8260	--	Sampled 14 wells Performed statistical analysis. Hexavalent Chromium by Method 7196 in all wells; and by Method 218.6 in wells MW-4A, MW-14S, MW-15S, and MW-15D.

Appendix III Parameters - As, Ba, Cd, Cr, F, Pb, Hg, N, Se, Ag, Endrin, Lindane, Methoxychlor, Toxaphene, 2,4-D, 2,4,5-TP (Silvex), Radium, Gross Alpha & Beta, Turbidity, coliform bacteria.
Water Quality Parameters - Cl, Fe, Mn, Phenols, Na, SO4
Indicator Parameters (IP) - TOX, TOC, pH, EC (quadruplicate)
624 - Volatile organics analysis
601/602 - Purgeable halocarbons/aromatics analysis
8010/8020 - Purgeable halocarbons/aromatic analysis
8260 - Purgeable halocarbons/aromatic analysis
MTBE - Methyl tertiary butyl ether
Appendix IX Parameters - See Appendix F in the October 1990 Quarterly Sampling Report for a complete listing of parameters.

The 14 wells currently included in quarterly sampling are MW-01S, MW-01D, MW-03, MW-04, MW-04A, MW-06B, MW-06D, MW-07, MW-09, MW-11, MW-14S, MW-15S, MW-15D, and MW-16. Ten shallow and four deep wells are analyzed for pH, metals (cadmium, chromium, and copper using EPA Method 6010A; and hexavalent chromium using EPA Method 7196), and purgeable halogenated/aromatic organic compounds (EPA Method 8260). As requested by DTSC, four downgradient wells (MW-04A,MW-14S, MW-15S, and MW-15D) were selected during the January 1998 sampling event for additional hexavalent chromium analysis using EPA Method 218.6. Historically, hexavalent chromium has not been detected in these wells at concentrations greater than the detection limit of 0.020 mg/L using EPA Method 7196. To assess if concentrations lower than 0.020 mg/L were present, split samples from these wells were analyzed by EPA Method 218.6 which has a lower detection limit of 0.00001 mg/L. A detailed listing of analytical parameters per sampling event is provided in Table 2-1.

Beginning with the July 1993 sampling event, the 14 wells have generally been purged and sampled in the following order: MW-01, MW-01D, MW-03, MW-11, MW-06B, MW-06D, MW-07, MW-04A, MW-04, MW-14S, MW-15S, MW-15D, MW-16, and MW-09.

2.1 Sampling Procedure

Field sampling was conducted in general accordance with procedures detailed in the RFI Work Plan. Sampling practices included efforts to detect floating product and hydrocarbon vapors at each well, measurement of the static water level and total depth of each well for calculating pre-sampling evacuation volumes, purging and sampling of groundwater for laboratory analysis, decontamination of sampling equipment, and handling of sample-filled containers in accordance with Section 4.3.3.5 of the RFI Work Plan. In general, these procedures were consistent with previous quarterly sampling by Kleinfelder. Details of previous procedures have been discussed in prior Quarterly Sampling Reports.

2.1.1 Organic Vapor Check

Standard field procedures include checking the interior of each well with a photoionization detector (PID) (equipped with a 10.0 eV lamp) for the presence of organic vapors whenever the well casing is opened. With the sampling team members standing upwind of the well, the well cap was opened slightly, allowing for the insertion of the PID probe tip inside the well. Readings were monitored until they stabilized, which was usually at zero parts per million (ppm). The final reading, as well as the peak reading, were recorded in the field log book. The cap was then removed and the well allowed to vent for a short period of time prior to measuring the static water level. The maximum PID readings taken during the collection of water level measurements are shown in Table 5-1 in Section 5.

2.1.2 Detection of Immiscible Layers

In order to detect the presence of floating, immiscible layers on top of the groundwater surface, a clear bailer was lowered approximately one-half the length of the bailer below the surface of the water in each well. The bailer was removed from the well and its contents checked for immiscible layers or iridescence. The PID probe was also inserted inside the bailer to check for volatile emissions. If immiscible fluids had been detected, a sample would have been collected for

laboratory analysis of purgeable halocarbons and aromatics (EPA Method 8260) and total petroleum hydrocarbons (California Department of Health Services [CA DHS] Method). The bailer was decontaminated and the sampling line discarded after each use. Immiscible layers have never been noted during CDM quarterly groundwater sampling at the PTI facility.

2.1.3 Static Water Level/Well Depth Measurement

On January 13, 1998, prior to the initiation of on-site well pumping, the static water level at 22 of the 24 on-site wells was measured three times at each well location with a decontaminated electric water level indicator (sounder) and recorded. The measurements collected in well MW-11 varied slightly (by 0.01 foot) and the data were averaged. The measurements collected in the remaining wells were identical, therefore, there was no need to collect additional measurements or average the data of these wells. The results of these measurements are shown in Table 5-1 and discussed in Section 5. One well (MW-06A) was dry, and MW-02 was not measured due to its proximity to MW-12S.

The water level in each well was also measured immediately prior to initiating well evacuation procedures for calculation of well purge volume. During measurement, the measuring (reference) point used was noted (i.e., the top of the steel casing), and the depth to water below the reference point was measured to the nearest 0.01 foot and recorded in the field log book. Well head elevation data was used with depth to water measurements to calculate groundwater elevation at each well location.

The bottom of each well sampled was also measured with the sounder to the nearest 0.1 foot. The amount of fill material in the bottom of the well was calculated from well construction data and noted in the log book. Prior to first use, the sounder was calibrated and the meter response checked. The sounder probe and line were decontaminated after each use.

2.1.4 Purge Volume Determination/Well Evacuation

Saturated casing volume was calculated at each well by using the depth to water and bottom sounding measurements obtained immediately prior to purging, to calculate the amount (height) of the saturated well casing. The inside diameter of the casing was then measured, and the following formula applied:

$$\text{Volume} = \pi \text{ radius}^2 \times \text{height}$$

A minimum of three saturated casing volumes of water were evacuated from each well prior to collecting a groundwater sample for laboratory analysis.

During the January 1998 sampling round, all 14 of the wells currently monitored were purged using a Grundfos 2-inch diameter submersible pump, and each well was sampled using a new disposable bailer.

For measurement of field parameters during well evacuation, a HF Scientific Model DRT-15 turbidity meter, an Orion Model 250A pH/temperature meter, and a YSI Model 33 electrical conductivity (EC) meter were used. The instruments were calibrated or field checked prior to use

with standard solutions in accordance with manufacturer's directions. The meters are used to determine the stability of discharge water field parameters prior to collection of a sample for laboratory analysis.

Periodically during well evacuation, the field parameters of the discharge water were measured and recorded in the log book. The physical appearance of the water (turbidity, color, sediment content, etc.) was also noted and recorded. Initial field turbidity measurements generally ranged from 1 to over 200 NTUs (nephelometric turbidity units) at the start of well evacuation. At the end of well evacuation, measurements were generally less than 10 NTUs. Higher turbidity at the start of purging seems to be related to agitating the water column and resuspending material from the bottom of the well during pump installation. After a minimum of three saturated casing volumes of water were evacuated from each well and the field parameters stabilized (change between readings of less than 5 to 10 percent), a sample for laboratory analysis was collected.

All purge water collected from each well was discharged directly into 55-gallon barrels for treatment by PTI in the facility's wastewater treatment system.

2.1.5 Sample Collection and Handling

Groundwater samples were collected with a disposable bailer from the approximate middle of the perforated section, and poured directly into previously-labeled sample bottles. During sample collection, the bailer was carefully and gently lowered past the air/water interface to minimize agitation and aeration of water during sample collection. The sample bottles were placed inside plastic zip-lock bags and then placed immediately into an ice-cooled chest. Prior to shipment, the bottles were cushioned with bubble wrap or plastic bags to avoid breakage. Samples collected for total metals analysis were field filtered using a 0.45 micron filter. Filters were discarded after each use.

The January 1998 groundwater samples were collected for laboratory analysis of the following parameters:

- Halogenated/Aromatic Volatile Organic Compounds by EPA method 8260
- Metals (Cd, Cu, and Cr)
- Hexavalent Chromium (Cr^{+6})
- pH

Groundwater sample bottles were numbered using the following format:

(e.g.)PTI-MW-01S-038

Where:

PTI	-	designates site acronym
MW01S	-	designates sample location number (MW = Monitoring Well)
EB	-	designates equipment blank sample
TB	-	designates travel blank sample
038	-	designates sequential sample number (per sampling event)

This was the 37th round of sampling conducted by CDM, however, due to a previous labeling inconsistency, a 038 sequence number was assigned to all groundwater samples collected during this round. Sample label information included date and time of sampling, CDM sample number, and analytical parameters.

All filled sample containers that were collected from each well were accompanied by chain-of-custody forms that indicated the label information as well as the responsible person during each step of the transportation process. All samples were sent by courier to Quanterra Laboratories in Santa Ana, California on the day that they were collected, and a copy of the chain-of-custody form for that day was retained by CDM field personnel. Copies of completed chain-of-custody forms are included in Appendix C. The laboratory was notified at the time of delivery that one or more hexavalent chromium (Cr^{+6}) sample(s) were contained in the shipment to ensure that the samples would be analyzed within the prescribed 24-hour holding period.

2.2 Equipment Decontamination Procedures

The following sections describe the procedures utilized to decontaminate groundwater sampling equipment.

2.2.1 Sampling Pump/Lines Decontamination

The submersible pump and discharge tubing used for well purging were decontaminated to reduce the possibility of cross-contamination between monitoring wells. The first step in the decontamination procedure was to submerge the pump into a decontaminated 5-gallon bucket containing a soap (Alconox, a laboratory-grade detergent) and water mixture, and pump at least five gallons of the solution through the system. The pump assembly was then submerged in another 5-gallon bucket filled with tap water and at least 10 gallons were pumped through the system. The final decontamination step was accomplished by submerging the pump into a decontaminated 5-gallon bucket containing deionized water (DI water) and pumping approximately five gallons of DI water through the system.

The exterior of the pump and discharge tubing was steam cleaned, as well as the exterior of the reel holding the tubing. The decontamination of the exterior pump line was performed over a plastic waterproof tarp. The tarp was placed on a gently sloping surface and bermed up at the edges, allowing the decontamination water to flow away from the equipment being cleaned. The spent water was recovered and stored in 55-gallon drums for treatment by PTI in the facility's wastewater treatment system.

2.2.2 Accessory Sampling Equipment Decontamination

Accessory sampling equipment such as the metals filter apparatus, bailer, and water level sounder were also decontaminated to minimize the possibility of cross-contamination between the monitoring wells. The filter apparatus, bailer, and sounder were decontaminated first by washing in a bucket of soap and water, followed by a tap water rinse, followed by a final DI water rinse. Bailers used to test for an immiscible layer were decontaminated and reused. The bailers and nylon rope that were used to sample wells were discarded immediately after use.

Section 3
Laboratory Testing

Analytical and duplicate testing of groundwater samples collected during January 1998 monitoring was provided by Quanterra Laboratories of Santa Ana, California. During the January 1998 quarterly sampling event, a total of 21 water samples were submitted for laboratory analysis. Fourteen monitoring well samples and two blind duplicate samples from MW-04 and MW-9 were collected and submitted to Quanterra for analysis of purgeable halocarbons/aromatics (EPA Method 8260), cadmium, total and hexavalent chromium, copper, and pH. In addition, two equipment blank samples were submitted for analysis of the above parameters. Three travel blanks (TB) were also submitted to Quanterra for analysis of purgeable halogenated/ aromatic organics.

The January 1998 groundwater analytical results are discussed in Section 6 and summarized in Tables 6-1 through 6-4. Quality assurance analytical results (duplicates, equipment blanks, and travel blanks) are discussed in Section 4.0 and summarized in Tables 4-1 through 4-4. Individual analytical reports for January 1998 are contained in Appendix B.

Section 4
Quality Assurance

To verify the accuracy and validity of analytical data, certain quality assurance procedures were implemented. The field and laboratory quality assurance results were checked for deviations from the Quality Assurance (QA) guidelines discussed in the RFI Work Plan.

4.1 Field Quality Assurance

The field QA procedures included the use of duplicate samples, equipment blanks, travel blanks, and the use of chain-of-custody forms. The results of the QA analyses have been compiled by type of parameter: purgeable halogenated organics, purgeable aromatic organics, and inorganics, in Tables 4-1 through 4-3, respectively. Table 4-4 lists quality assurance results which are outside the ranges specified in the RFI Work Plan. Detection limits of parameters analyzed are shown in the analytical reports contained in Appendix B.

4.1.1 Duplicate Samples

Standard accepted practice is to submit one duplicate sample for analysis for approximately every tenth sample collected, a ratio of 1 to 10. During the January 1998 round of sampling, duplicate samples were collected from monitoring wells MW-04 and MW-9. The duplicate samples were submitted to the analytical laboratory as blind samples, and were designated MW-35 and MW-37, respectively, on the chain of custody forms. Monitoring wells MW-04 and MW-9 were selected due to elevated concentrations of certain contaminants detected during previous sampling rounds. Analytical results for the duplicate samples for January 1998 are shown in Tables 4-1, 4-2, and 4-3.

Duplicate results which deviate greater than 20% from the original results are shown in Table 4-4. All duplicate analytical results were within 20% of the original sample results.

4.1.2 Equipment Blanks

Analytical results for the equipment blanks collected during January 1998 are shown in Tables 4-1, 4-2 and 4-3.

Equipment blank EB-01 was obtained by allowing deionized water to run through a new, precleaned, disposable bailer. The other equipment blank (EB-02) was obtained by pouring deionized water over the submersible pump after decontamination. The samples were collected in the appropriate containers and submitted for laboratory analysis. Sample EB-01 was collected to evaluate the effectiveness of the factory cleaning process. Sample EB-02 was collected following pump decontamination after sampling well MW-16. The equipment blanks were submitted to the laboratory for analysis of purgeable halogenated/aromatic volatile compounds (EPA Method 8260), cadmium, chromium (total and hexavalent), copper, and pH. The analytical results did not show any detections above the method detection limits in samples EB-01 and EB-02.

TABLE 4-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Purgeable Halogenated Organic Analytical Results
(ug/L)

Sample Identification	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	1,1-Dichloro-ethene (1,1-DCE)	1,1-Dichloro-ethane (1,1-DCA)	1,2-Dichloro-ethane (1,2-DCA)	1,1,1-Trichloro-ethane (1,1,1-TCA)	Chloroform (CHCL3)	Methylene chloride (CH2CL2)
PTI-EB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-EB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-MW04	ND <10	**180**	**42**	**72**	**61**	ND <10	ND <10	**46**
PTI-MW04-DUP	ND <5.0	**170**	**43**	**67**	**58**	ND <5.0	**9.2**	**44**
PTI-MW9	ND <10	**270**	**67**	**240**	**200**	**37**	**99**	**20**
PTI-MW9-DUP	ND <10	**260**	**65**	**230**	**210**	**34**	**95**	**20**
PTI-TB01	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB02	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI-TB03	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
DI = Deionized water blank.
TB = Travel Blank

TABLE 4-2
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Purgeable Aromatic Organic Analytical Results
(µg/L)

Sample Identification	Benzene	Toluene	Ethyl-benzene	Xylenes (Total)
PTI-EB01	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-EB02	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-MW04	ND <5.0	ND <10	**530**	**420**
PTI-MW04-DUP	ND <2.5	ND <5.0	**480**	**390**
PTI-MW9	ND <5.0	ND <10	**690**	**260**
PTI-MW9-DUP	ND <5.0	ND <10	**660**	**260**
PTI-TB01	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-TB02	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI-TB03	ND <0.50	ND <1.0	ND <1.0	ND <1.0

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected.
NA = Parameter not analyzed.
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
DI = Deionized Water Blank
TB = Travel Blank

TABLE 4-3
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Quality Assurance Samples
Inorganic Analytical Results
(mg/L)

Well Identification	Cadmium EPA- 6010-L	Chromium (Hexavalent) EPA- 7196	Chromium (Total) EPA-6010-L	Copper EPA-6010-L	pH EPA-9040
PTI-EB01	ND <0.0050	ND <0.020	ND <0.010	ND <0.020	**5.8**
PTI-EB02	ND <0.0050	ND <0.020	ND <0.010	ND <0.020	**6.5**
PTI-MW04	**0.53**	**39.2**	**44.0**	ND < 0.020	**6.9**
PTI-MW04-DUP	**0.50**	**43.6**	**42.8**	ND < 0.020	**6.9**
PTI-MW9	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.9**
PTI-MW9-DUP	ND < 0.0050	ND < 0.020	ND < 0.010	ND < 0.020	**6.9**

ND = Analytical parameter not detected.
NA = Parameter not analyzed.
MW = Monitoring Well
MW-DUP = Monitoring Well - Duplicate
DI = Deionized Water Blank
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.

TABLE 4-4
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Quality Assurance Deviations

Quality Assurance Criteria	Cadmium (mg/l)	Chromium, Hexavalent (mg/l)	Chromium, Total (mg/l)	Copper (mg/l)	Benzene (ug/l)	Toluene (ug/L)	Ethyl-Benzene (ug/l)	Xylenes, Total (ug/l)	Halogenated Volatile Organic Compounds (ug/l)
Equipment Blanks									
PTI-EB01- 038									
PTI-EB02- 038									
Travel Blanks									
PTI-TB01- 038									
PTI-TB02- 038									
PTI-TB03- 038									
Laboratory Blanks									
Method Blank									
Duplicate Deviation (>20%)									
PTI-MW04- 038									
PTI-MW09- 038									
Holding Time Exceedance									

0.01/0.01 = Concentration/Detection Limit
MW - DUP = Monitoring Well - Duplicate
EB01 = Equipment Blank collected from a new disposable bailer.
EB02 = Equipment Blank collected from the submersible pump.
TB = Travel Blank

Note: There were no QA exceedances during the January 1998 sampling event.

4.1.3 Travel Blanks

The detection of compounds in travel blanks is generally indicative of systematic contamination from sample transport, laboratory glassware cleaning, laboratory storage, or analytical procedures. During the January 1998 sampling event, three laboratory-prepared travel blanks (TB01 through TB03) consisting of organic-free water were labeled and submitted to the lab for purgeable halocarbon and aromatic volatile organic analysis by EPA Method 8260. Each travel blank was stored with the day's samples, to be analyzed for volatile organic compounds. Tables 4-1 and 4-2 show the results of the travel blank analyses. The analytical results from the three travel blanks did not show any detections above the method detection limits.

4.1.4 Sample Control

All sample containers were labeled immediately prior to sampling with the sample identification information completed with a waterproof pen. Samples were transported under chain-of-custody and hand delivered by courier to the laboratory in ice-cooled chests. Copies of the chain-of-custody records are included in Appendix C.

4.2 Laboratory Quality Assurance

General QA procedures for Quanterra Laboratory, which performed laboratory analysis on all monitor well and quality assurance samples, are discussed in the RFI report. Quanterra provides internal laboratory QA/QC results with each sample analytical report. Matrix spike, matrix spike duplicate, method blank, and duplicate control sample results are noted in the QA/QC reports. In addition, surrogate recoveries are also noted for volatile organics analyses. The laboratory QA/QC results were within acceptable limits for the January 1998 sampling. The laboratory control sample results were also within acceptable limits.

Section 5
Groundwater Elevation

On January 13, 1998, prior to the initiation of well evacuation procedures, the depth to groundwater was measured in 22 of the 24 on-site monitoring wells. Groundwater elevations were calculated by subtracting the depth to static water level from the surveyed elevation of the corresponding monitoring well. All of the monitoring well casing elevations were surveyed during the RFI and three wells (MW-04, MW-09, and MW-10) were resurveyed in January 1996 following wellhead repair. During the January 1998 groundwater sampling round, water level measurements were taken at shallow wells MW-01S, MW-03, MW-04, MW-05, MW-06B, MW-07, MW-08, MW-09, MW-10, MW-11, MW-12S, MW-13S, MW-14S, MW-15S, and MW-16. Water level measurements were also taken at deep wells MW-01D, MW-04A, MW-06D, MW-12D, MW-13D, MW-14D, and MW-15D. These wells were measured in order to evaluate the direction and gradient of groundwater flow underlying the facility and to help characterize the shallow and deep aquifer interaction. Well MW-02 was not measured due to its proximity to MW-12S. Well MW-06A was measured and found to be dry.

Table 5-1 lists the depths to water and groundwater elevations for each well sampled. Figure 5-1 shows the approximate groundwater surface elevation of the upper Hollydale Aquifer for wells screened in the shallow interval (45 to 77 feet below ground surface) using data collected during the January 1998 sampling round. The contours shown in Figures 5-1 and 5-2 were generated by D.C.A., a surface contouring software developed by Softdisk, which is commonly used in conjunction with CADD (Computer Aided Drafting and Design) to produce contour maps and other graphics.

The direction of groundwater flow as observed in the shallow monitoring wells is approximately S 67° W at an average gradient of 0.40 foot per 100 feet in the western portion of the facility, where the majority of the monitoring wells are located. The gradient is slightly steeper than the October 1997 gradient of 0.30 foot per 100 feet and the flow direction has an increased westward component from that obtained in October 1997 (S 50°W).

Figure 5-2 shows the approximate groundwater elevation of the lower Hollydale Aquifer for wells screened in the deeper interval (78.3 to 123.5 feet below ground surface). Groundwater contours for the deeper wells follow the same general trend as those of the shallow wells. The direction of groundwater flow is approximately S 65°W at an average gradient of 0.35 foot per 100 feet. As observed in the shallow wells, the gradient is slightly steeper than the October 1997 gradient of 0.31 foot per 100 feet and the flow direction has an increased westward component from that obtained in October 1997 (S 51°W).

With the 22 wells measured for water level during the January 1998 sampling round, there were seven locations where a deep well was measured adjacent to a shallow well. Shallow wells are screened within the interval of 45 to 77 feet. Deep wells are screened within the interval of 78.3 to 107 feet, with the exception of MW-15D which is screened from 108.5 to 123.5 feet. Of the well pairs, groundwater elevations at deep wells MW-01D, MW-04A, MW-06D, MW-12D, and

TABLE 5-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Groundwater Elevation Data

Well No.	Well Headspace* (ppm)	Total Depth Constructed (ft)	Total Depth Measured (ft)	Perforated Intervals (ft)	Calculated Casing Fill (ft)	M.P. Elevation (ft)	Depth to Water (ft below MP)	G.W. Elevation(ft)
1S	5.8 / 0.0	62.5	62.6	47-62.5	---	152.63	39.40	113.23
1D	0.0 / 0.0	94.8	96.0	79.5-94.5	---	152.60	39.31	113.29
3	8.7 / 0.0	74.1	73.3	45-75	0.8	151.71	40.03	111.68
4	48.0 / 0.0	67.5	70.2	45-75	---	152.37	40.71	111.66
4A	0.0 / 0.0	107.0	108.4	87-107	---	152.46	40.66	111.80
5	0.9 / 0.0	75.0	---	45-75	---	153.26	42.33	110.93
6A	218.0 / 0.0	---	---	10-30	---	---	DRY	---
6B	0.9 / 0.0	77.6	77.1	45-75	0.5	149.53	37.47	112.06
6D	4.9 / 0.0	95.5	93.9	79-94	1.6	150.16	38.04	112.12
7	56.0 / 1.9	71.6	71.5	45-75	0.1	149.42	37.95	111.47
8	227.0 / 0.0	71.0	---	41-71	---	149.98	38.02	111.96
9	23.4 / 0.0	73.5	75.5	44-77	---	152.96	40.90	112.06
10	4.8 / 0.0	75.0	---	45-75	---	153.89	41.89	112.00
11	56.5 / 0.0	75.5	74.0	55-75	1.5	152.81	40.58	112.23
12S	75 / 0.0	72.0	---	51-72	---	152.64	39.96	112.68
12D	0 / 0.0	101.0	---	84.5-100	---	152.63	39.94	112.69
13S	26.0 / 0.0	70.3	---	50.3-70.3	---	151.51	39.10	112.41
13D	0.0 / 0.0	93.3	---	78.3-93.3	---	151.52	39.01	112.51
14S	15.6 / 0.0	71.5	70.8	46-72	0.8	150.50	39.07	111.43
14D	0.0 / 0.0	109.0	---	88-103	---	150.56	39.12	111.44
15S	0.9 / 0.0	71.5	71.5	51.5-71.5	---	151.01	39.95	111.06
15D	0.0 / 0.0	123.8	123.6	108.5-123.5	0.2	150.96	39.99	110.97
16	33.1 / 0.0	62.5	61.9	42-62	0.6	150.22	38.30	111.92

M.P. = Measuring point (top of steel casing)
G.W. = Groundwater
--- = Not measured or not calculated.

* = Measured with PID prior to sampling (wellhead/casing)
Note: Depth to water measurements collected on January 13, 1998 prior to purging/sampling on-site wells.

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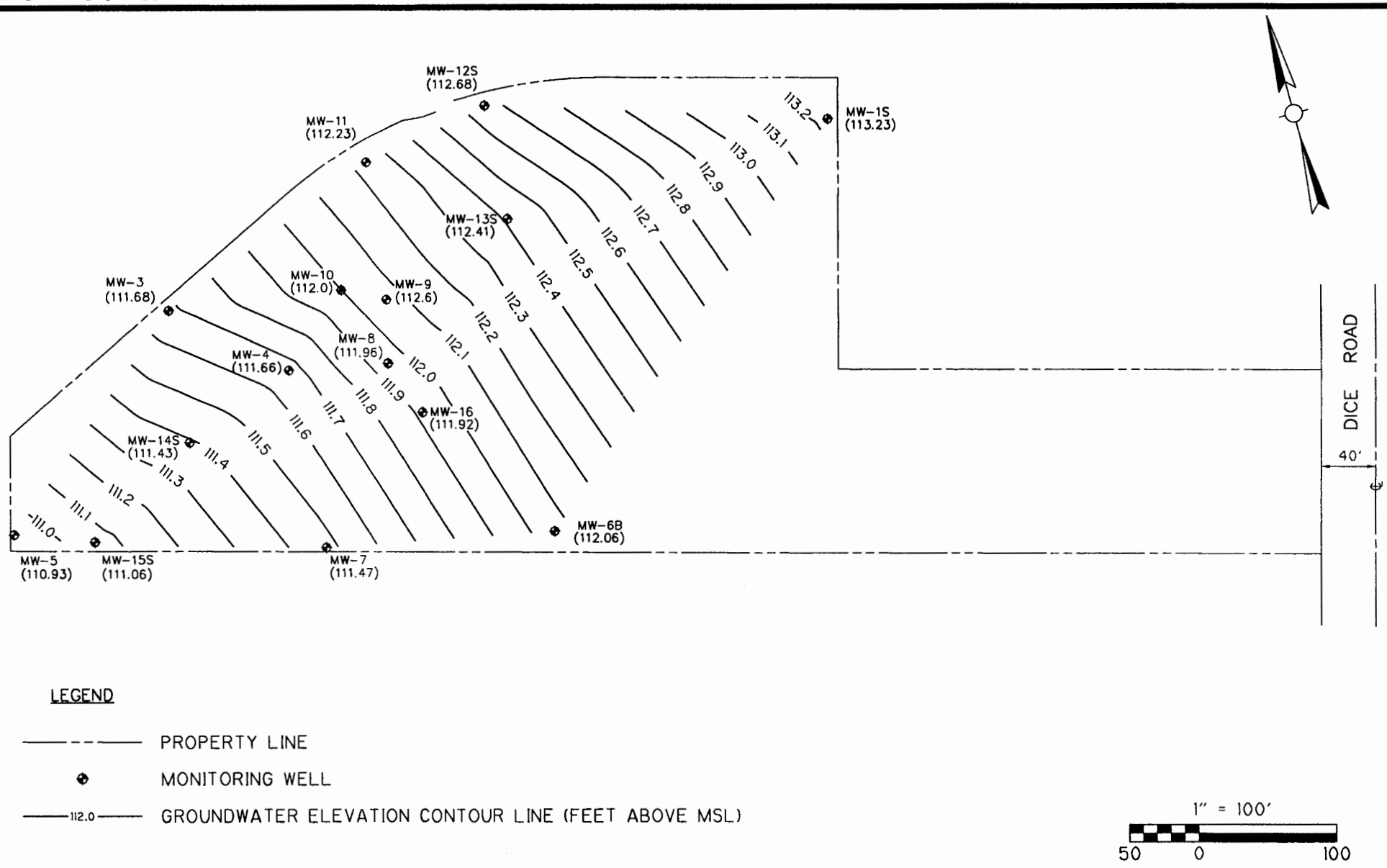

LEGEND

PROPERTY LINE

MONITORING WELL

112.0 GROUNDWATER ELEVATION CONTOUR LINE (FEET ABOVE MSL)

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

GROUNDWATER ELEVATION CONTOURS - SHALLOW WELLS JANUARY 1998

CDM
environmental engineers, scientists, planners, & management consultants

Figure 5-1

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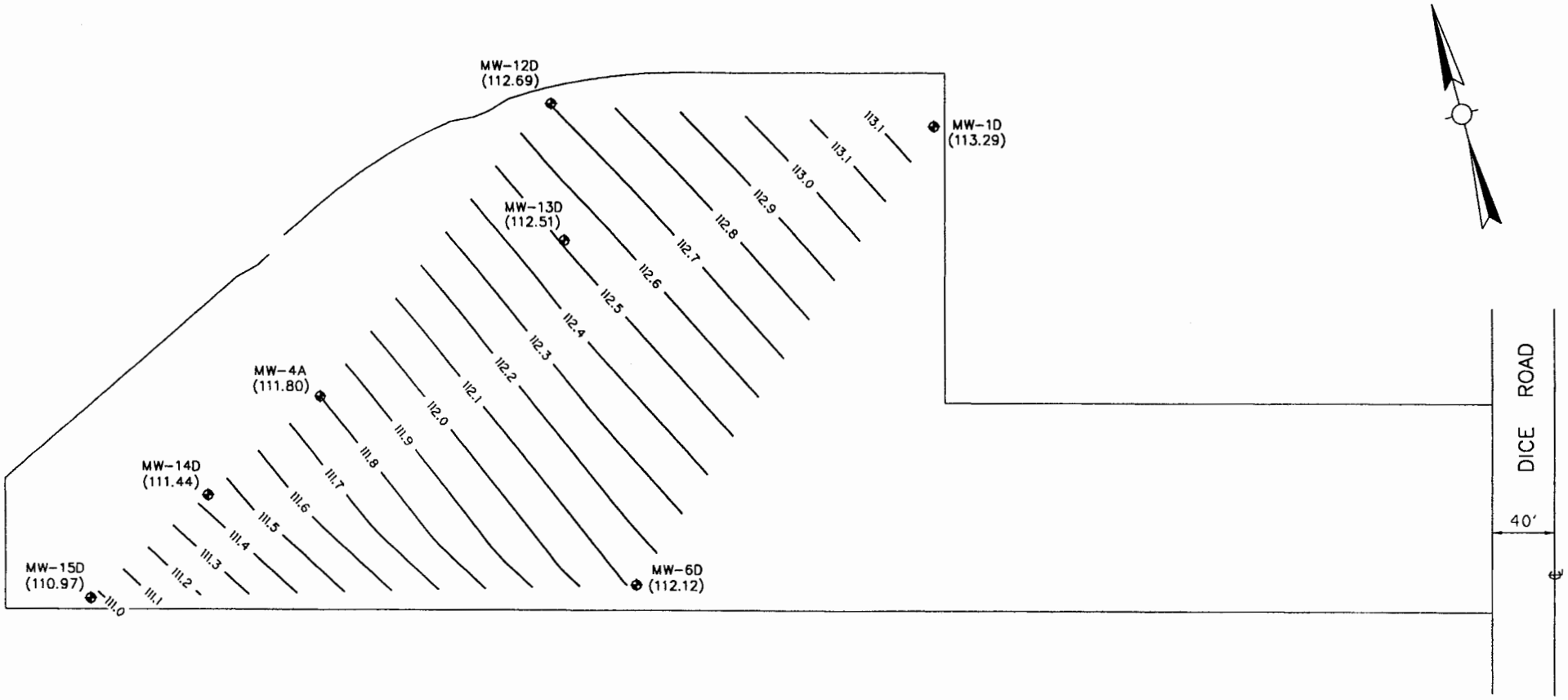

LEGEND

PROPERTY LINE

MONITORING WELL

112.0 GROUNDWATER ELEVATION CONTOUR LINE (FEET ABOVE MSL)

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

GROUNDWATER ELEVATION CONTOURS - DEEP WELLS JANUARY 1998

CDM
environmental engineers, scientists, planners, & management consultants

Figure 5-2

MW-14D were slightly higher (0.01 to 0.14 feet) than the corresponding shallow well elevations. The groundwater elevation at deep well MW-15D was slightly lower (0.09 feet) than the corresponding shallow well elevation. Based on these and past groundwater elevation comparisons among shallow and deep well pairs, it does not appear that a well-defined vertical gradient between shallow and deep intervals exists.

In general, groundwater elevations during the January 1998 sampling event decreased slightly from the previous quarter. Water level decreases ranged from a minimum of 1.56 feet at well MW-1D, to a maximum of 2.03 feet at MW-5.

Section 6
Groundwater Quality

In order to compare the analytical data from the previous sampling events (1989 through July 1997 quarterly events) with the January 1998 data, Table 6-1 was compiled. This table compares groundwater analytical parameters (hexavalent and total chromium, cadmium, copper, purgeable aromatics and trichloroethene), and groundwater elevations at shallow well locations which were sampled during January 1998. Laboratory analytical reports from all wells sampled during the January 1998 sampling round are located in Appendix B.

Consistent with the results of laboratory testing performed on the groundwater samples collected since January 1989 from the on-site monitoring wells, three contaminant plumes in the Hollydale Aquifer were identified. Historically, these plumes have been present at varying concentrations and lateral extent. One small plume, consisting primarily of site-specific metals parameters, has been aligned in a northeasterly to southwesterly direction in the vicinity of wells MW-04 and MW-14S. The second, consisting of purgeable aromatics, has also been aligned in a northeasterly to southwesterly direction with the highest concentrations generally found in wells MW-04 and MW-09. The third plume consists of trichloroethene and related parameters with highest concentrations generally detected in wells MW-04, MW-09, and MW-11.

6.1 Purgeable Halogenated Organic Compounds

Table 6-2 shows the analytical results for purgeable halogenated organic compounds in deep and shallow wells during January 1998. Trichloroethene was the primary compound detected, with miscellaneous other halogenated organics also detected. The table also shows, for comparison purposes, maximum contaminant limits (MCLs) and concentrations for water supply wells in the Santa Fe Springs area. The supply wells, however, are likely screened much deeper than the wells at PTI. The City of Santa Fe Springs Annual Water Quality Report for 1996 is contained in Appendix D of this document.

Trichloroethene

Trichloroethene (TCE) was detected in all 14 of the groundwater monitoring wells sampled during January 1998. The highest concentration of TCE detected in January 1998 was 390 μg/L in well MW-11, a decrease from the result of 600 μg/L in October 1997. The second highest concentration of TCE detected was 270 μg/L in well MW-09, a decrease from the result of 350 μg/L in October 1997. The third highest concentration of TCE detected was 180 μg/L in well MW-04, a decrease from the result of 230 μg/L in October 1997.

Detected concentrations of TCE in the remainder of the shallow wells in January 1998 generally did not change substantially from October 1997, and they ranged in concentration from 5.0 μg/L in MW-15S to 97 μg/L in MW-7. Deep well detections also remained generally unchanged, and ranged from 3.0 μg/L in MW-01D to 14 μg/L in MW-04A. Concentrations for TCE detected in shallow and deep wells are shown in Figures 6-1 and 6-2, respectively.

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 1S																		
Jan-89	96.74	ND	0.01		0.014	ND	0.003	ND	0.009	ND	0.01	ND	0.01	ND	0.01	ND	0.01	19
Apr-89	100.45	ND	0.05		0.1	ND	0.01	ND	0.02	ND	0.7	ND	1	ND	1		3	23
Jul-89	99.00	ND	0.05		0.06		0.01		0.03	ND	0.7	ND	1	ND	1	ND	1	13
Oct-89	96.76	ND	0.05	ND	0.02	ND	0.01	ND	0.05	ND	0.5	ND	1	ND	1	ND	1	12
Jan-90	97.73	ND	0.02	ND	0.01	ND	0.01	ND	0.02	ND	0.5	ND	0.5	ND	0.5	ND	1	16
Apr-90	99.30	ND	0.02		0.02	ND	0.005		0.02	ND	2.5	ND	2.5	ND	2.5	ND	5	20
Jul-90	100.83	ND	0.02	ND	0.01	ND	0.01		0.03	ND	0.5	ND	0.5	ND	0.5	ND	1	18
Oct-90	99.81	ND	0.02	ND	0.01	ND	0.005		0.023	ND	0.5	ND	1	ND	1	ND	1	18
Jan-91	99.19	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	26
Apr-91	101.95	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	22
Jul-91	102.94	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	17
Oct-91	102.33	ND	0.02		0.01	ND	0.005		0.02	ND	0.5	ND	1	ND	1	ND	1	14
Jan-92	104.60		0.10	ND	0.0081	ND	0.0027		0.04	ND	1		1.5		1.2		4.3	13
Apr-92	107.28	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	0.5	ND	0.5	ND	0.5	9.9
Jul-92	107.87	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	10
Oct-92	105.53	ND	0.02	ND	0.01	ND	0.005		0.035		0.95	ND	1	ND	1	ND	1	11
Jan-93	109.82	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		2.2		1.3		5.6	9.2
Apr-93	116.01	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	5.7
Jul-93	116.59	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		1.7		1.7		4	11
Oct-93	116.50	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		2.2		4.3	14
Jan-94	116.60	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	9.3
Apr-94	117.10	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	14
Jul-94	117.80	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	7.9
Oct-94	112.23	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1		5.8	13
Jan-95	113.59	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	5.2
Apr-95	118.78	ND	0.02		0.0029	ND	0.001	ND	0.02	ND	0.5	ND	1		1.3		1	4.4
Jul-95	120.06	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		1.2		3.5		6.1	6.2
Oct-95	116.48	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		1.7		3.9	15
Jan-96	114.84	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		1.7		5.1	8.4
Apr-96	118.03	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		3.4		4.9	2.9
Jul-96	117.42	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		2.2		3.7	9.7
Oct-96	113.85	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		2.1		2.8	16
Jan-97	115.73	ND	0.02	ND	0.01	ND	0.005		0.022	ND	0.5	ND	1	ND	1		2.0	6.0
Apr-97	118.21	ND	0.02	ND	0.01	ND	0.005	ND	0.020	ND	0.5	ND	1		1.4		1.2	15
Jul-97	118.18	ND	0.02	ND	0.01	ND	0.005	ND	0.020	ND	0.5	ND	1	ND	1	ND	1	14
Oct-97	114.82	ND	0.02	ND	0.01	ND	0.005		0.023	ND	0.5	ND	1	ND	1	ND	1	12
Jan-98	113.23	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	12

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								PURGEABLE HALOCARBONS	
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)	
MW - 3																			
Jan-89	95.02	ND	0.01	ND	0.014	ND	0.003	ND	0.009		7.4		17		4,900		1,500		74
Apr-89	99.29	ND	0.05		0.07	ND	0.01	ND	0.02	ND	50	ND	50		1,200		60		110
Jul-89	98.21	ND	0.05		0.06	ND	0.01	ND	0.02	ND	7	ND	10	ND	10	ND	10		120
Oct-89	94.75	ND	0.05	ND	0.02	ND	0.01	ND	0.05	ND	50	ND	100		1,600		150	ND	100
Jan-90	95.98	ND	0.02	ND	0.01	ND	0.01	ND	0.02	ND	5	ND	5		110	ND	10		65
Apr-90	97.72	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50	ND	50		2,100		720		74
Jul-90	99.27	ND	0.02	ND	0.01	ND	0.01	ND	0.02	ND	5	ND	5	ND	5	ND	10		130
Oct-90	97.29	ND	0.02	ND	0.01	ND	0.005	ND	0.02		9		2	ND	1	ND	1		130
Jan-91	97.69	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		38
Apr-91	99.81	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		27
Jul-91	101.63	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		28
Oct-91	100.99	ND	0.02	ND	0.01	ND	0.005		0.03	ND	0.5	ND	1	ND	1	ND	1		71
Jan-92	103.44	ND	0.05	ND	0.0081	ND	0.0027		0.02	ND	1	ND	1	ND	1		4		76
Apr-92	106.04	ND	0.02	ND	0.02	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	0.5		25
Jul-92	106.61	ND	0.02		0.02	ND	0.005		0.13	ND	0.5	ND	1	ND	1	ND	1		76
Oct-92	103.93	ND	0.02	ND	0.02	ND	0.005		0.038		0.52	ND	1	ND	1	ND	1		130
Jan-93	107.28	ND	0.02	ND	0.01	ND	0.005		0.096	ND	2.5	ND	5	ND	5	ND	5		84
Apr-93	115.17	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		12
Jul-93	115.92	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		3.3		2.6		5.9		16
Oct-93	115.67	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		2.6		4.8		17
Jan-94	115.59	ND	02/0.4**	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		10
Apr-94	116.33	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		15
Jul-94	116.91	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		26
Oct-94	110.85	ND	0.02	ND	0.01	ND	0.005	ND	0.02		1.2		3.5		1.5		12		76
Jan-95	111.83	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1		72
Apr-95	117.83	ND	0.02		0.0023	ND	0.001	ND	0.02	ND	0.5	ND	1		1.3	ND	1		57
Jul-95	119.20	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		2.0		5.2		8.8		9.5
Oct-95	115.45	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		1.7		3.3		30
Jan-96	113.41	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1		5.1		26
Apr-96	116.73	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		2.6		3.6		46
Jul-96	116.33	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	0.5		1.8		9.0		12		17
Oct-96	112.45	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		5.4		6.2		21
Jan-97	114.19	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		2.6		1.1		4.2		28
Apr-97	117.13	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		4.3		2.1		3.0		13
Jul-97	117.18	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1.0		2.5		3.7		13
Oct-97	113.60	ND	0.02	ND	0.01	ND	0.005	ND	0.02		0.57	ND	1.0		1.7		1.2		24
Jan-98	111.68	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		1.3	ND	1		25

** Hexavalent chromium sample or result for MW03 likely switched with MW30 (dup. of MW04). Laboratory reported MW03 result of 0.4 mg/L and MW30 result of ND at a detection limit of 0.02 mg/L.

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 4										
Jan-89	95.21	33.0	400.0	0.028	N D 0.009	N D 0.5	10	15	29	120
Apr-89	99.19	43.0	100.0	0.05	0.02	N D 5	23	15	50	280
Jul-89	98.19	120.0	98.0	0.08	0.06	N D 14	N D 20	140	40	290
Oct-89	94.92	110.0	120.0	0.07	N D 0.05	N D 0.5	N D 1	N D 1	N D 1	250
Jan-90	95.87	109.0	95.1	0.12	N D 0.02	N D 12	N D 12	N D 12	N D 25	220
Apr-90	97.50	81.7	80.7	0.13	0.02	N D 10	N D 10	N D 10	N D 20	280
Jul-90	99.20	100.0	101.0	0.35	N D 0.02	N D 50	N D 50	1,600	170	320
Oct-90	98.33	58.9	48.4	0.23	0.022	N D 0.5	17	230	650	250
Jan-91	97.68	49.4	65.3	0.26	N D 0.02	N D 0.5	N D 1	N D 1	1,200	180
Apr-91	100.50	23.8	18.4	0.076	N D 0.02	N D 0.5	N D 1	730	N D 1	170
Jul-91	101.47	39.1	78.5	0.61	N D 0.02	N D 0.5	16,000	6,700	18,000	190
Oct-91	100.91	42.0	40.8	0.21	N D 0.01	N D 0.5	6,900	4,100	10,000	N D 400
Jan-92	103.33	41.0	34.0	0.47	0.045	N D 250	18,000	10,000	17,200	N D 250
Apr-92	105.94	32.2	29.2	0.84	0.053	6.7	7.2	960	1,010	280
Jul-92	106.5	79.9	59.7	0.86	N D 0.02	N D 5	N D 10	200	280	280
Oct-92	103.92	21.6	27.1	0.32	N D 0.02	71	N D 10	1,300	230	230
Jan-93	107.13	16.4	27.4	0.28	N D 0.02	N D 130	10,000	10,000	19,000	N D 250
Apr-93	115	1.8	2.2	N D 0.005	N D 0.02	N D 0.5	N D 1	88	13	25
Jul-93	115.52	21.0	23.2	0.2	0.056	0.6	2.0	1.8	11	100
Oct-93	115.76	* 35.5/99.2	80.3	0.71	N D 0.2	1.3	N D 1	N D 1	40	290
Jan-94	115.42	0.36	36.0	0.23	N D 0.02	0.81	N D 1	8.3	14	130
Apr-94	116.20	26.9	26.4	0.33	N D 0.02	N D 0.5	N D 1	4	6.5	190
Jul-94	116.76	59.0	41.4	0.20	0.038	0.58	N D 1	N D 1	4.2	340
Oct-94	110.86	60.7	52.8	0.45	N D 0.02	N D 5	N D 10	270	39	390
Jan-95	111.88	28.8	34.3	0.13	0.026	N D 5	N D 10	350	130	190
Apr-95	117.69	8.6	9.1	0.21	0.052	N D 100	1600	1700	2900	67
Jul-95	119.05	* 28.1/20.8	29.6	0.27	*.10/ND<.02	N D 10	* 270/410	* 260/380	* 890/1300	90
Oct-95	115.35	**30.8	28.9	0.38	N D 0.02	N D 2.5	N D 5	75	21	150
Jan-96	113.37	25.7	32.4	0.19	N D 0.02	N D 50	100	2,100	1,400	160
Apr-96	116.65	* 32.2/24.6	38.0	0.60	N D 0.02	N D 25	680	1,300	1,400	130
Jul-96	116.17	50	58.9	0.28	N D 0.02	N D 50	ND 100	1,000	270	140
Oct-96	112.38	63.8	75.7	0.46	N D 0.04	N D 50	380	1,100	1,900	310
Jan-97	114.07	*45.9/34.9	34.5	0.54	0.02	N D 6.2	ND 12	1,100	ND 12	330
Apr-97	116.96	27.3	18.8	0.53	N D 0.02	N D 12	35	1,300	620	150
Jul-97	117.04	36.0	35.2	0.62	N D 0.02	ND 5	ND 10	810	110	150
Oct-97	113.46	73.8	85.3	0.64	ND 0.08	ND 5	ND 10	460	31	230
Jan-98	111.66	39.2	44.0	0.53	ND 0.02	ND 5	ND 10	530	420	180

* 35.5/99.2 = original sample/duplicate sample (both results presented because duplicate result deviation is >20%)

** Analyzed after holding time had expired.

TABLE 6-1
PHIBRO-TECH, INC.
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Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 6B																		
Jan-89	95.12	N D	0.01	N D	0.014	N D	0.003	N D	0.009	N D	0.01	N D	0.01	N D	0.01	N D	0.01	57
Apr-89	99.11	N D	0.05		0.06	N D	0.01	N D	0.02	N D	0.7	N D	1	N D	1	N D	1	37
Jul-89	98.39	N D	0.05		0.04	N D	0.01	N D	0.02	N D	0.7	N D	1	N D	1	N D	1	29
Oct-89	95.35	N D	0.05	N D	0.02	N D	0.01	N D	0.05	N D	0.5	N D	1	N D	1	N D	1	29
Jan-90	96.1	N D	0.02	N D	0.01	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1	46
Apr-90	97.76	N D	0.02		0.02	N D	0.005	N D	0.02	N D	2.5	N D	2.5	N D	2.5	N D	5	61
Jul-90	99.28	N D	0.02		0.02	N D	0.01	N D	0.02	N D	0.5	N D	0.5	N D	0.5	N D	1	51
Oct-90	98.45	N D	0.02		0.012	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	52
Jan-91	97.87	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	59
Apr-92	105.86	N D	0.02		0.014	N D	0.005	N D	0.02	N D	0.5	N D	0.5		1.1		0.82	19
Jul-92	106.57	N D	0.02		0.019	N D	0.005		0.054	N D	0.5	N D	0.5	N D	1	N D	1	10
Oct-92	104.12	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		12		2.9		13	9.3
Jan-93	107.23	N D	0.02		0.011	N D	0.005		0.038	N D	0.5	N D	1	N D	1	N D	1	6.9
Apr-93	114.64	N D	0.02		0.014	N D	0.005	N D	0.02	N D	0.5		64		26.0		88	2.6
Jul-93	115.34	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.2		2.0		5.5	2.7
Oct-93	115.46	N D	0.02		0.011	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	5.9
Jan-94	115.37	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	2.7
Apr-94	116.15	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	2.0
Jul-94	116.67	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1	N D	1		1.9	2.9
Oct-94	111.13	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.5	N D	1		8.2	1.5
Jan-95	112.19	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		110		89		110	8.6
Apr-95	117.42	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.6		9.1		6.2	2.3
Jul-95	118.93	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.1		4.0		5.1	8.8
Oct-95	115.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1		1.0	2.6
Jan-96	113.47	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		28		27		53	14
Apr-96	116.65	N D	0.02		0.011	N D	0.005	N D	0.02	N D	1		4.2		37		50	2.9
Jul-96	116.18	N D	0.01	ND	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1		2.3		3.5	2.3
Oct-96	112.66	N D	0.01	ND	0.01	N D	0.005	N D	0.02	N D	0.5		1.0		2.1		2.8	6.1
Jan-97	114.20	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		4.3		4.3		6.4	5.0
Apr-97	116.95	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		3.6		1.7	N D	1	5.2
Jul-97	117.01	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	ND	1	N D	1	6.6
Oct-97	113.71	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	ND	1	N D	1	6.4
Jan-98	112.06	N D	0.02	ND	0.01	N D	0.005	N D	0.02	N D	0.5		15		32		39	17.0

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Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 7																		
Jan-89	89.47	ND	0.01	ND	0.014	ND	0.003	ND	0.009	ND	0.5		1.4		1.2		3.6	35
Apr-89	98.83	ND	0.05		0.02	ND	0.01	ND	0.02	ND	0.7	ND	1	ND	1	ND	1	47
Jul-89	97.90	ND	0.05		0.03	ND	0.01	ND	0.05	ND	0.7	ND	1	ND	1	ND	1	25
Oct-89	94.72	ND	0.05	ND	0.02	ND	0.01	ND	0.05	ND	0.5	ND	1	ND	1	ND	1	44
Jan-90	95.58	ND	0.02	ND	0.01	ND	0.01	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5	39
Apr-90	97.32	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5	46
Jul-90	98.85	ND	0.02	ND	0.01	ND	0.01	ND	0.02	ND	1	ND	1	ND	1	ND	2	34
Oct-90	98.02	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	19
Jan-91	97.41	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	1.8
Apr-91	100.06	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	30
Jul-91	101.20	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	53
Oct-91	100.62	ND	0.02	ND	0.01	ND	0.005		0.01	ND	0.5	ND	1	ND	1	ND	1	54
Jan-92	102.90		0.07	ND	0.0081	ND	0.0027		0.14	ND	1	ND	1	ND	1	ND	1	120
Apr-92	105.54	ND	0.02		0.013	ND	0.005		0.032	ND	0.5	ND	1	ND	1	ND	1	55
Jul-92	103.13	ND	0.02		0.095	ND	0.005		0.21	ND	1	ND	2	ND	2	ND	2	53
Oct-92	103.68	ND	0.02		0.063	ND	0.005		0.65	ND	0.5	ND	1	ND	1	ND	1	98
Jan-93	106.82	ND	0.02		0.033	ND	0.005		0.19	ND	0.5	ND	1	ND	1	ND	1	73
Apr-93	114.54	ND	0.02		0.011	ND	0.005	ND	0.02	ND	1.2	ND	2.5		90		5.6	23
Jul-93	115.14	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	5	ND	10		210	ND	10	43
Oct-93	115.23	ND	0.2	ND	0.01	ND	0.005		0.02		0.82	ND	1		7.2	ND	1	44
Jan-94	115.08	ND	0.02	ND	0.01	ND	0.005	ND	0.02		1.4	ND	1		33	ND	1	53
Apr-94	115.88	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5		200	ND	5	96
Jul-94	116.44	ND	0.02	ND	0.01	ND	0.005		0.023		0.88	ND	1		7.7		1.2	140
Oct-94	110.69	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		5.1		5.5	98
Jan-95	111.59	ND	0.02	ND	0.01	ND	0.005		0.026	ND	0.5		7.0		8.7		10	170
Apr-95	117.24	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		1.3	ND	1	26
Jul-95	118.63	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1		2.1		3.4	53
Oct-95	115.08	ND	0.02		0.014	ND	0.005		0.079		0.74	ND	1		3.8		1.4	98
Jan-96	112.98	ND	0.02	ND	0.01	ND	0.005		0.043		1.0		4.2		4.9		10	85
Apr-96	116.39	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		1.3		11		14	37
Jul-96	115.83	ND	0.01	ND	0.01	ND	0.005	ND	0.02		1.0	ND	1		1.6		2.7	87
Oct-96	112.17	ND	0.01	ND	0.01	ND	0.005		0.036		0.96	ND	1		1.4		1.5	150
Jan-97	113.76	ND	0.02	ND	0.01	ND	0.005		0.029	ND	0.5	ND	1		1.7		2.8	95
Apr-97	116.62	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		1.1		1.2	ND	1	63
Jul-97	116.74	ND	0.02	ND	0.01	ND	0.005	ND	0.02		0.56	ND	1.0	ND	1	ND	1	54
Oct-97	111.27	ND	0.02	ND	0.01	ND	0.005		0.025	ND	0.5	ND	1.0	ND	1	ND	1	85
Jan-98	111.47	ND	0.02		0.01	ND	0.005		0.044	ND	0.5		2.2		5.2		6.8	97

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW-9																		
Jan-89	95.55		0.45		0.33	ND	0.003	ND	0.009	ND	0.5	ND	0.5	ND	0.5	ND	1	55
Apr-89	99.67	ND	0.02		0.06	ND	0.01	ND	0.02	ND	0.7	ND	1	ND	1	ND	1	24
Jul-89	98.77	ND	0.05		0.17	ND	0.01		0.02	ND	0.7	ND	1	ND	1	ND	1	57
Oct-89	95.62		2.5		1.8	ND	0.01	ND	0.05	ND	0.5	ND	1	ND	1	ND	1	110
Jan-90	96.44		2.28		2.2	ND	0.01	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5	100
Apr-90	98.26		0.8		0.81	ND	0.005	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5	150
Jul-90	99.78		0.03		0.04	ND	0.01	ND	0.02	ND	2.5	ND	2.5	ND	2.5	ND	5	64
Oct-90	98.69		0.25		0.19	ND	0.005		0.062	ND	0.5	ND	1	ND	1	ND	1	17
Jan-91	98.04		0.124		0.085	ND	0.005	ND	0.02	ND	0.5		6.6		1.4		9	26
Apr-91	100.83	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1	ND	1	26
Jul-91	101.88	ND	0.02		0.027	ND	0.005	ND	0.02	ND	0.5	ND	1		99	ND	1	41
Oct-91	101.30		0.05		0.07	ND	0.005	ND	0.01	ND	0.5	ND	1		94	ND	1	120
Jan-92	103.62	ND	0.05	ND	0.0081	ND	0.0027		0.031	ND	1	ND	1		1,220		92	45
Apr-92	106.27	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.05		2,800		3,600		6,190	52
Jul-92	106.93	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.05		34,000		7,900		24,000	ND 1000
Oct-92	104.3	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	1000		83,000		13,000		58,000	ND 1000
Jan-93	107.56	ND	0.02		0.057	ND	0.005		0.053	ND	50		400		3,900		5,300	ND 100
Apr-93	115.26	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50		5,100		4,000		9,200	110
Jul-93	115.81	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	16	ND	33		160		74	1100
Oct-93	115.79	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5		120		45	390
Jan-94	115.76	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	10		48		290		220	230
Apr-94	116.51	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	500		17000		12000		32000	270
Jul-94	117.03	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	1000		56000		15000		40000	200
Oct-94	111.17	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	500		57000		11000		34000	350
Jan-95	112.25	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	250		8200		9800		2000	310
Apr-95	117.92	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50	ND	100		650		480	670
Jul-95	119.31	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	10		69		780		340	540
Oct-95	115.67	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	25		110		670		1900	320
Jan-96	113.73	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50		100		4,300		6,100	500
Apr-96	117.00	ND	0.02	ND	0.01	ND	0.005	ND	0.02		3.3		5.5		24		22	580
Jul-96	116.49	ND	0.01	ND	0.01	ND	0.005	ND	0.02		4.6	ND	2		42		4.3	570
Oct-96	112.73	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	50	ND	100		2,900		350	470
Jan-97	114.46	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5	ND	5	ND	5	400
Apr-97	117.29	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	5	ND	10		18	ND	10	770
Jul-97	117.34	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	25	ND	50		2,500		860	850
Oct-97	113.75	ND	0.02		0.048	ND	0.005	ND	0.02	ND	25		150		1,900		4800	ND 50
Jan-98	112.06	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	5	ND	10		690		260	270

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 11																		
Jan-89	95.97	ND	0.01	ND	0.014	ND	0.003	ND	0.009	ND	0.5	ND	0.5	43		1.5		34
Apr-89	99.85	ND	0.02		0.04	ND	0.01	ND	0.02	ND	500		7,500	2,600		11,000		39
Jul-89	98.95	ND	0.05	ND	0.02	ND	0.01		0.13	ND	7	ND	10	ND	10	90		29
Oct-89	95.77	ND	0.05	ND	0.02	ND	0.01	ND	0.05	ND	5	ND	10	200	ND	10		35
Jan-90	96.72	ND	0.02	ND	0.01	ND	0.01	ND	0.02	ND	5	ND	5	83	ND	10		46
Apr-90	98.44	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5		3	370		150		33
Jul-90	100.00	ND	0.02	ND	0.01	ND	0.01		0.03	ND	25		440	1,000		760		65
Oct-90	98.97	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		15,000	3,000		10,000	ND	1
Jan-91	98.29	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		15,000	4,700		12,000	ND	1
Apr-91	101.17	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		8,500	3,300		7,500		63
Jul-91	102.19	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5		57	520		220		61
Oct-91	101.61	ND	0.02	ND	0.01	ND	0.005	ND	0.01	ND	0.5		140	2,000		660		110
Jan-92	104.09		0.10	ND	0.0081	ND	0.0027		0.02	ND	1		7.3	230		26		85
Apr-92	106.61	ND	0.02	ND	0.01	ND	0.005	ND	0.01	ND	0.05		1.7	130		2.3		70
Jul-92	107.12	ND	0.02		0.02	ND	0.005		0.09	ND	0.05	ND	0.05	17	ND	0.05		160
Oct-92	104.55	ND	0.02		0.011	ND	0.005	ND	0.01	ND	0.05	ND	0.05	11	ND	0.05		160
Jan-93	108.27	ND	0.02		0.013	ND	0.005		0.088	ND	1.2	ND	2.5	110	ND	2.5		86
Apr-93	115.6	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.05	ND	1	2	ND	1		59
Jul-93	116.07	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.05		2.5	1.8		6.4		230
Oct-93	116.01	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	2.1		3.1		150
Jan-94	116.03	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	2.5		2.8		190
Apr-94	116.83	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1.0	ND	1.0	80
Jul-94	117.23	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	ND	1.0	1.6		180
Oct-94	111.30	ND	0.02		0.011	ND	0.005	ND	0.02	ND	0.5	ND	1	4.5	ND	1.0		360
Jan-95	112.53	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	10		660	850		1100		660
Apr-95	118.26	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	50	ND	100	1900		1000		74
Jul-95	119.51	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5	160		37		140
Oct-95	115.80	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	0.5	ND	1	5.8		2.2		180
Jan-96	113.98	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	25		520	460		1,000		620
Apr-96	117.37	ND	0.02	ND	0.01	ND	0.005		0.023	ND	25		160	1,100		1,400		240
Jul-96	116.75	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	10	ND	20	460		290		220
Oct-96	112.95	ND	0.01	ND	0.01	ND	0.005	ND	0.02	ND	0.5		1.9	20		8.0		250
Jan-97	114.78	ND	0.02	ND	0.01	ND	0.005		0.029	ND	0.5		9.4	84		88		160
Apr-97	117.60	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	2.5	ND	5	120		8.2		370
Jul-97	117.61	ND	0.02	ND	0.01	ND	0.005		0.15	ND	2.5	ND	5	8.3	ND	5.0		240
Oct-97	114.02	ND	0.02	ND	0.01	ND	0.005		0.1	ND	2.5	ND	5	ND	5	ND	5.0	350
Jan-98	112.23	ND	0.02	ND	0.01	ND	0.005	ND	0.02	ND	12		770	1800		2200		390

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS				PURGEABLE AROMATICS				HALOCARBONS
		Hexavalent Chromium (mg/L)	Total Chromium (mg/L)	Cadmium (mg/L)	Copper (mg/L)	Benzene (ug/L)	Toluene (ug/L)	Ethyl-Benzene (ug/L)	Total Xylenes (ug/L)	Trichloroethene (ug/L)
MW - 14S										
Oct-90	98.07	3.2	2.2	0.018	5.3	N D 0.5	N D 1	1,750	N D 1	180
Jan-91	97.38	0.4	0.94	0.007	1	N D 0.5	N D 1	2,800	5,900	108
Apr-91	99.26	0.39	0.41	0.005	0.15	N D 0.5	N D 1	4,100	N D 1	84
Jul-91	101.27	0.02	0.31	0.005	0.11	N D 0.5	N D 1	31	N D 1	55
Oct-91	100.66	0.13	0.23	N D 0.005	0.05	N D 0.5	N D 1	680	N D 1	81
Jan-92	103.08	0.27	0.15	N D 0.0027	0.093	N D 1	N D 1	N D 1	N D 1	59
Apr-92	105.70	0.13	0.16	N D 0.005	0.04	N D 0.5	N D 0.5	N D 0.5	N D 0.5	56
Jul-92	106.38	0.1	0.33	N D 0.005	0.56	0.6	N D 1	N D 1	N D 1	44
Oct-92	103.72	0.16	0.54	N D 0.005	0.72	N D 1	N D 1	N D 1	N D 1	71
Jan-93	107.00	0.056	0.24	N D 0.005	0.33	N D 0.5	N D 1	N D 1	N D 1	56
Apr-93	114.80	N D 0.02	0.018	N D 0.005	0.032	N D 0.5	24	40	55	18
Jul-93	115.36	N D 0.02	0.20	N D 0.005	0.023	N D 0.5	1.3	1.2	3.8	25
Oct-93	115.42	N D 0.02	0.01	N D 0.005	0.021	N D 0.5	ND 1	2.1	3.7	25
Jan-94	115.28	N D 0.02	0.015	N D 0.005	0.022	N D 0.5	ND 1	3.2	1.4	21
Apr-94	116.06	N D 0.02	0.022	N D 0.005	N D 0.020	N D 0.5	ND 1	ND 1.0	ND 1.0	29
Jul-94	116.64	N D 0.02	0.016	N D 0.005	N D 0.020	N D 0.5	ND 1	ND 1.0	ND 1.0	15
Oct-94	110.70	0.035	0.064	N D 0.005	N D 0.020	0.53	ND 1	ND 1.0	ND 1.0	58
Feb-95	113.10	N D 0.02	0.016	N D 0.005	0.020	N D 50	ND 100	3000	690	50
Apr-95	117.50	N D 0.02	N D 0.01	N D 0.005	N D 0.020	N D 5	76	120	190	20
Jul-95	118.93	N D 0.02	N D 0.01	0.0055	N D 0.020	N D 0.5	2.8	26	12	22
Oct-95	115.25	0.022	0.046	N D 0.005	N D 0.020	N D 0.5	ND 1	2.1	2.0	35
Jan-96	113.13	N D 0.02	0.034	N D 0.005	0.024	N D 1	4.7	87	58	42
Apr-96	116.52	0.021	0.028	N D 0.005	N D 0.020	N D 2.5	54	120	110	51
Jul-96	116.04	ND 0.01	0.069	N D 0.005	N D 0.020	0.58	ND 1	20	10	37
Oct-96	112.22	0.052	0.082	N D 0.005	N D 0.020	N D 0.5	ND 1	13	2.9	61
Jan-97	113.85	0.024	0.031	N D 0.005	N D 0.020	N D 2.5	ND 5	470	ND 5	90
Apr-97	116.82	N D 0.02	0.032	0.0053	N D 0.020	0.58	2.9	91	36	45
Jul-97	117.21	N D 0.02	0.016	ND 0.005	ND 0.020	ND 5	ND 1	14	1	35
Oct-97	113.39	0.1	0.013	ND 0.005	ND 0.020	ND 0.5	ND 1	20	1.8	57
Jan-98	111.43	* N D/0.0103	0.018	ND 0.005	0.020	ND 0.5	1.1	19	5.0	50

* ND/10.3 = EPA method 7196/EPA Method 218.6 (Sample was analyzed for hexavalent chromium by two methods.)

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								PURGEABLE HALOCARBONS	
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)	
MW - 15S																			
Oct-90	97.71	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	21	
Jan-91	97.10	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		4		1.6		4	13	
Apr-91	99.71	N D	0.02	N D	0.01		0.011	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	28	
Jul-91	100.94	N D	0.02	N D	0.01		0.014	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	17	
Oct-91	100.35	N D	0.02		0.01		0.02		0.06	N D	0.5	N D	1	N D	1	N D	1	13	
Jan-92	102.72	N D	0.051	N D	0.0081		0.008		0.01	N D	1	N D	1	N D	1	N D	1	15	
Apr-92	105.29	N D	0.02	N D	0.01	N D	0.005	N D	0.01	N D	0.5	N D	0.5	N D	0.5	N D	0.5	4.1	
Jul-92	105.95	N D	0.02		0.04		0.005		0.27	N D	0.5	N D	0.5	N D	0.5	N D	0.5	2.9	
Oct-92	103.37	N D	0.02	N D	0.02		0.0073		0.047	N D	0.5	N D	0.5	N D	0.5	N D	0.5	N D	1
Jan-93	106.58	N D	0.02		0.014		0.0085		0.1	N D	0.5	N D	1	N D	1	N D	1	9.0	
Apr-93	114.41	N D	0.02		0.013	N D	0.005	N D	0.02	N D	0.5		14		10		22	4.6	
Jul-93	115.01	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.2	N D	1		2.4	2.4	
Oct-93	115.07	N D	0.04	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	3.2	
Jan-94	114.90	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	1.9	
Apr-94	115.72	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	3.1	
Jul-94	116.31	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	2.1	
Oct-94	110.42	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	6.0	
Jan-95	111.14		0.048		0.044	N D	0.005	N D	0.02	N D	1		4.0		64		27	3.7	
Apr-95	117.15	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5		60		82		130	2.8	
Jul-95	118.61	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		2.5		18		12	5.2	
Oct-95	114.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1		1.0	N D	1	3.9	
Jan-96	112.69	N D	0.02		0.012	N D	0.005	N D	0.02	N D	0.5		1.8		25		22	3.8	
Apr-96	116.09	N D	0.02		0.015	N D	0.005	N D	0.02	N D	0.5		13		40		45	2.8	
Jul-96	115.69	N D	0.01		0.014	N D	0.005	N D	0.02	N D	0.5	N D	1		9.7		5.4	3.2	
Oct-96	111.81	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1		2.9		2.6	5.3	
Jan-97	113.42	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5		5.5		69		1.0	5.1	
Apr-97	116.35	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5		9.3		21		8.5	3.3	
Jul-97	116.60	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5	ND	1		8.2		1.3	4.1	
Oct-97	113.08	N D	0.02		0.01	N D	0.005	N D	0.02	N D	0.5	ND	1		17.0		1.7	5.2	
Jan-98	111.06	* N D/0.0177			0.021	N D	0.005	N D	0.02	N D	0.5	ND	1		12		3.7	5.0	

* ND/17.7 = EPA method 7196/EPA Method 218.6 (Sample was analyzed for hexavalent chromium by two methods.)

TABLE 6-1
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring
Historical Results

Monitor Well No. / Date	Groundwater Elevation (Feet MSL)	METALS								PURGEABLE AROMATICS								HALOCARBONS
		Hexavalent Chromium (mg/L)		Total Chromium (mg/L)		Cadmium (mg/L)		Copper (mg/L)		Benzene (ug/L)		Toluene (ug/L)		Ethyl-Benzene (ug/L)		Total Xylenes (ug/L)		Trichloroethene (ug/L)
MW - 16																		
Apr-92	105.99	N D	0.02	N D	0.01	N D	0.005	N D	0.01	N D	0.5	0.69		1		1.6		52
Jul-92	106.7	N D	0.02		0.03	N D	0.02		0.35	N D	0.5	N D	1	N D	1	N D	1	35
Oct-92	104.07	N D	0.02		0.011	N D	0.005		0.15	N D	0.5	N D	1	N D	1	N D	1	72
Jan-93	107.3	N D	0.02	N D	0.01	N D	0.005		0.44	N D	1.2	N D	2.5	N D	2.5	N D	2.5	51
Apr-93	114.9	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	25		55		2,300		1,200	42
Jul-93	115.54	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	50	N D	100		3,100		2,000	15
Oct-93	115.51	N D	0.04	N D	0.01	N D	0.005	N D	0.02	N D	5.0	N D	10		340	N D	10	24
Jan-94	115.46	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.02	N D	20		1,000	N D	20	22
Apr-94	116.25	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	10	N D	20		820	ND	20	37
Jul-94	116.78	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	25	N D	50		1300		730	76
Oct-94	111.02	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		1.5		2.4		9.7	91
Jan-95	112.08	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1	N D	1	N D	1	17
Apr-95	117.60	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	5		16		36		55	34
Jul-95	118.99	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	10	N D	20	* 540/370		N D	20	67
Oct-95	115.45	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1		1.8		1.3	60
Jan-96	113.49	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1		11		9.7	26
Apr-96	116.72	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5		9.8		30		33	36
Jul-96	116.24	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	0.5	N D	1		6.6		3.6	110
Oct-96	112.59	N D	0.01	N D	0.01	N D	0.005	N D	0.02	N D	5		49		130		230	73
Jan-97	114.18	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1		4.6		23	ND	2	32
Apr-97	117.01	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1	N D	2		7.2		2.4	31
Jul-97	117.12	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	1.2	ND	2.5		6.5	ND	2.5	30
Oct-97	113.66	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	2.5	ND	5		8.2	ND	5	53
Jan-98	111.92	N D	0.02	N D	0.01	N D	0.005	N D	0.02	N D	0.5	ND	1		12	ND	3.8	29

ND = Below detection limit as noted

MSL = Mean Sea Level

* 540/370 = original sample/duplicate sample (both results presented because duplicate result deviation is >20%)

TABLE 6-2
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Purgeable Halogenated Organic Analytical Results
(µg/L)

Well Identification	Tetrachloro-ethene (PCE)	Trichloro-ethene (TCE)	1,1-Dichloro-ethene (1,1-DCE)	1,1-Dichloro-ethane (1,1-DCA)	1,2-Dichloro-ethane (1,2-DCA)	Carbon Tetrachloride (CCL4)	1,1,1-Trichloro-ethane (1,1,1-TCA)	Chloroform (CHCL3)	trans-1,2-Dichloro-ethene (trans-1,2-DCE)	Methylene Chloride (CH2CL2)
PTI- MW01S	ND <1.0	12	ND <1.0	1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW01D	1.8	3.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW03	1.6	25	3.2	2.0	ND <1.0	27	ND <1.0	19	ND <1.0	ND <1.0
PTI- MW04	ND <10	180	42	72	61	ND <10	ND <10	ND <10	ND <10	46
PTI- MW04A	1.8	14	2.9	11	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW06B	1.1	17	ND <1.0	1.7	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW06D	1.5	8.7	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW07	ND <1.0	97	10	38	24	ND <1.0	ND <1.0	1.6	ND <1.0	ND <1.0
PTI- MW09	ND <10	270	67	240	200	ND <10	37	99	ND <10	20
PTI- MW11	ND <25	390	28	56	ND <25	ND <25	ND <25	ND <25	ND <25	ND <25
PTI- MW14S	1.2	50	11	13	4.7	21	ND <1.0	11	ND <1.0	ND <1.0
PTI- MW15S	1.4	5.0	ND <1.0	ND <1.0	ND <1.0	4.2	ND <1.0	2.9	ND <1.0	ND <1.0
PTI- MW15D	1.4	3.9	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0	ND <1.0
PTI- MW16	1.8	29	13	92	57	ND <1.0	ND <1.0	ND <1.0	2.4	ND <1.0
MCL	5.0	5.0	6.0	5.0	0.5	0.5	200	—	10	—
SGV GW	ND-4.8	ND-1.2	ND	ND	ND	ND	ND	—	ND	—

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area during the year 1996.

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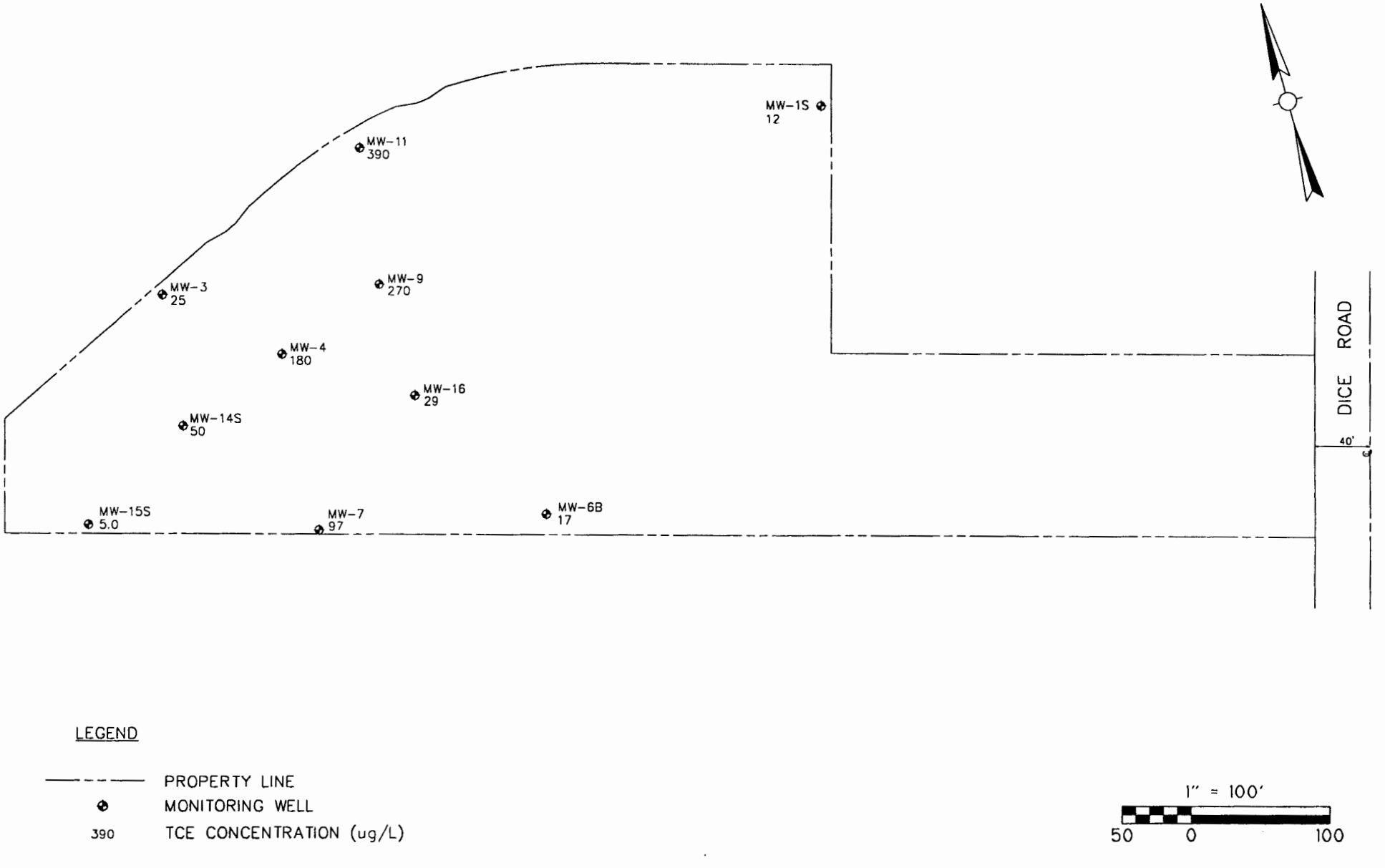

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TCE CONCENTRATIONS – SHALLOW WELLS JANUARY 1998

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Figure 6-1

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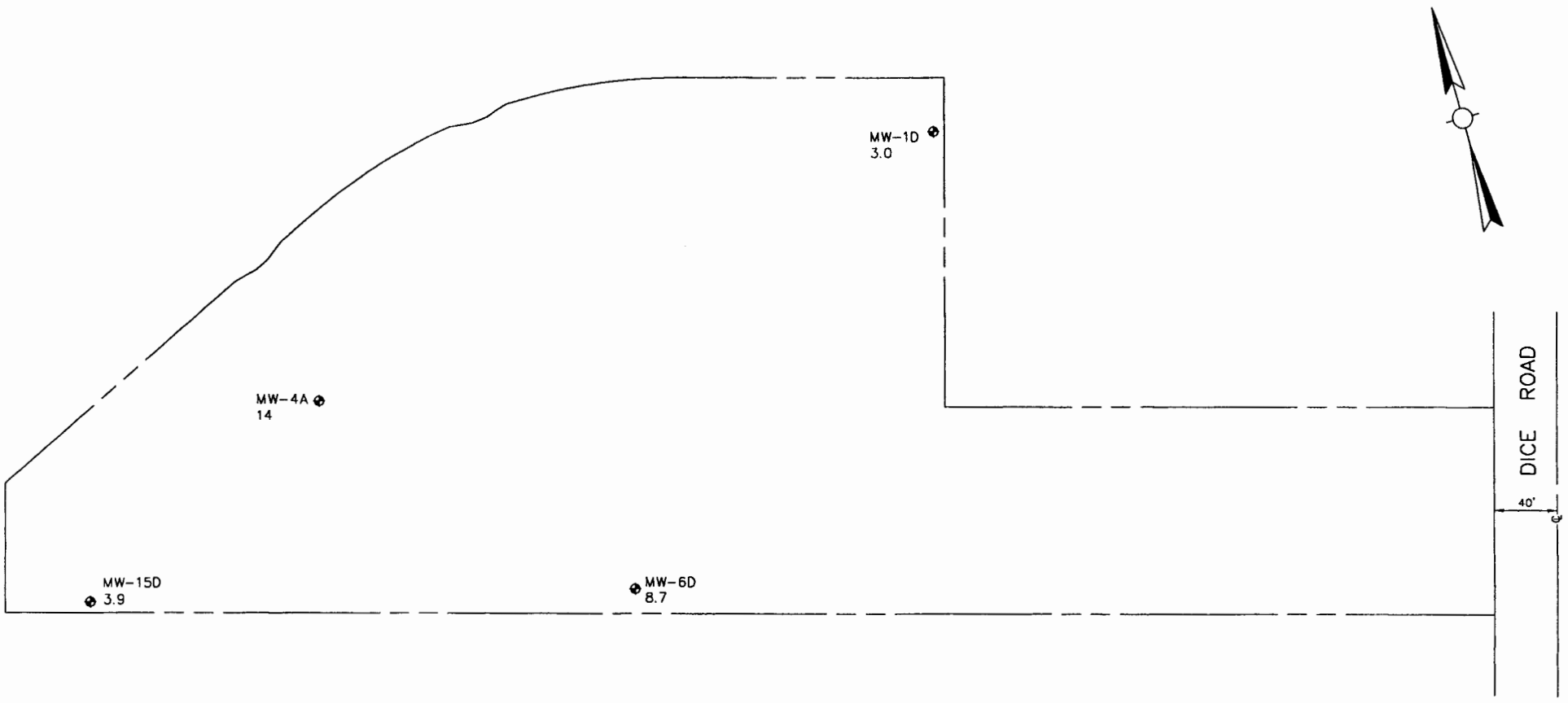

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TCE CONCENTRATIONS – DEEP WELLS JANUARY 1998

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Figure 6-2

A review of the analytical results contained in Table 6-1 reveals that, with minor exceptions, TCE has historically been detected in all on-site monitoring wells, including the upgradient wells. Past discussions with Department of health Services (now Cal EPA Department of Toxic Substances Control) and Regional Water Quality Control Board staff indicate that TCE is generally recognized as a regional groundwater contaminant.

Other Halogenated Organics

During the January 1998 sampling, other purgeable halocarbon compounds were detected in most of the on-site wells at concentrations ranging from 1.0 μg/L 1,1-dichloroethane (MW-01S) to 240 μg/L 1,1-dichloroethane (MW-09). The compounds tetrachloroethene; 1,1-dichloroethene; 1,2-dichloroethane; carbon tetrachloride; chloroform; and methylene chloride were also detected in several wells. The compounds 1,1,1-trichloroethane and trans-1,2-dichloroethene were detected in one well (MW-09 and MW-16, respectively). Detections of these other chlorinated organic compounds are assumed to be related to the TCE plume.

6.2 Purgeable Aromatic Organic Compounds

According to PTI personnel, organic chemicals have not historically been used on-site in any of the production processes. Two 10,000 gallon underground storage tanks (diesel and gasoline), however, were located in the approximate center of the facility, due east of the drum wash area. During tank removal operations in July 1989, petroleum hydrocarbon contamination was discovered in the tank excavation. The RFI report indicated that petroleum hydrocarbon contamination was not detected at depths below 30 feet near the former tank locations. Although they have not been used on-site, purgeable aromatic compounds have been historically detected in groundwater underlying the facility. The primary organic compounds of concern are toluene, ethylbenzene and total xylenes, which vary in both concentration and lateral extent. The RFI report indicated that these compounds appeared to be migrating onto the subject property from the property to the north. According to Los Angeles County Department of Public Works files, leaks from tanks containing purgeable aromatic compounds with subsequent groundwater contamination are known to have occurred at the property to the north of PTI.

Purgeable aromatic compound results for January 1998 are presented in Table 6-3. Concentrations of total aromatic compounds for the shallow wells are illustrated on Figure 6-3. Historic sampling results indicate that purgeable aromatic contamination originated off-site to the north and has migrated onto the subject property. During previous sampling events, elevated concentrations of toluene, ethylbenzene and xylenes were detected in MW-11 and MW-3 along the northern perimeter of the property. Since approximately July 1991, elevated concentrations of these compounds have been detected in well MW-04, indicating that the plume may be migrating downgradient. In addition, since January 1992 high concentrations have also been detected in well MW-09. The results of the January 1998 sampling show that the highest concentrations of total purgeable aromatics (BTEX) were detected in MW-11(Figure 6-3), which had BTEX concentrations greater than the respective MCLs. The second highest total BTEX concentrations were detected in wells MW-04 and MW-09.

TABLE 6-3
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Purgeable Aromatic Organic Analytical Results
(µg/L)

Well Identification	Benzene	Toluene	Ethylbenzene	Xylenes (Total)
PTI- MW01S	ND <0.50	ND <1.0	ND <1.0	ND <1.0
PTI- MW01D	ND <0.50	ND <1.0	**1.1**	ND <1.0
PTI- MW03	ND <0.50	ND <1.0	**1.3**	ND <1.0
PTI- MW04	ND <5.0	ND <10	**530**	**420**
PTI- MW04A	ND <0.50	ND <1.0	**1.8**	**1.9**
PTI- MW06B	ND <0.50	**15**	**32**	**39**
PTI- MW06D	ND <0.50	**3.9**	**12**	**15**
PTI- MW07	ND <0.50	**2.2**	**5.2**	**6.8**
PTI- MW09	ND <5.0	ND <10	**690**	**260**
PTI- MW11	ND <12	**770**	**1800**	**2200**
PTI- MW14S	ND <0.50	**1.1**	**19**	**5.0**
PTI- MW15S	ND <0.50	ND <1.0	**12**	**3.7**
PTI- MW15D	ND <0.50	ND <1.0	**7.6**	**2.3**
PTI- MW16	ND <0.50	ND <1.0	**12**	**3.8**
MCL	**1**	**150**	**700**	**1,750**
SGV GW	ND	ND	ND	ND

All analyses performed by EPA Method 8260.
ND = Analytical parameter not detected
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area during the year 1996.

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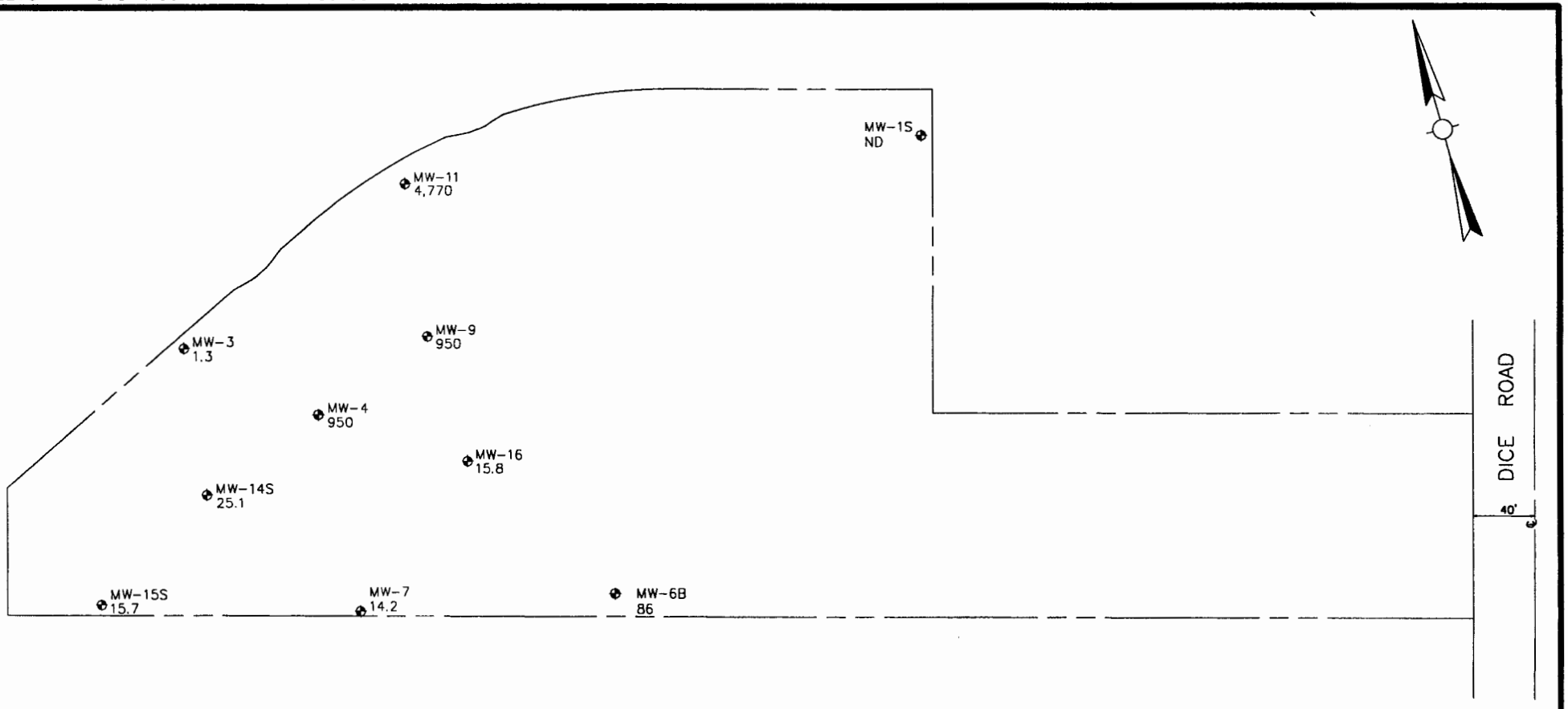

LEGEND

———	PROPERTY LINE
⊕	MONITORING WELL
4,770	TOTAL BTEX CONCENTRATION (ug/L)
ND	NOT DETECTED

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TOTAL BTEX CONCENTRATIONS – SHALLOW WELLS JANUARY 1998

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Figure 6-3

Benzene

During the January 1998 sampling, benzene was not detected in any of the wells sampled. During the October 1997 sampling event, benzene was only detected in one well (MW-03) at a concentration of 0.57 μg/L. Historical evidence indicates that benzene is not a contaminant of concern for the facility.

Toluene

Toluene was detected in five monitoring wells that did not contain tolouene concentrations during the October 1997 sampling event. Well MW-11 had the highest concentration of 770 μg/L, a significant increase from the nondetect value reported in October 1997. Well MW-11 also had significant increases in ethylbenzene and total xylenes in comparison to the nondetect values of those constituents reported in October 1997 (discussed below). In October 1997, toluene was detected only in well MW-09, which did not contain a detectable concentration during the January 1998 event.

Significant toluene concentrations have been detected during July 1990 to July 1991 (MW-11), April 1991 to January 1992 (MW-04), April 1992 to April 1993 (MW-09), and April 1994 to January 1995 (MW-09). Concentrations were also detected at location MW-04 during January 1993. Elevated ethylbenzene and total xylene concentrations are generally associated with elevated toluene concentrations.

Ethylbenzene

During the January 1998 sampling round, ethylbenzene was detected in 13 of the 14 wells at generally higher concentrations than those detected in October 1997. Well MW-11 had the highest concentration of 1,800 μg/L, a significant increase from the nondetect value reported in October 1997. Well MW-09 had the second highest concentration of 690 μg/L, a decrease from 1,900 μg/L detected in October 1997. Well MW-04 had the third highest concentration of 530 μg/L, a slight increase from 460 μg/L detected in October 1997. The remaining wells with ethylbenzene detections had relatively low concentrations ranging from 1.1 μg/L in MW-01D to 32 μg/L in MW-6B.

Total Xylenes

During the January 1998 sampling round, total xylenes were detected in 11 of the 14 wells at generally higher concentrations than those detected in October 1997. MW-11 had the highest concentration of 2,200 μg/L, a significant increase from the nondetect value reported in October 1997. Well MW-04 had the second highest concentration of 420 μg/L, a increase from 31 μg/L detected in October 1997. Well MW-09 had the third highest concentration of 260 μg/L, a significant decrease from 4,800 μg/L detected in October 1997. The remaining wells with xylene detections had relatively low concentrations ranging from 1.9 μg/L in MW-04A to 39 μg/L in MW-06B.

6.3 Inorganic and Miscellaneous Parameters

Table 6-4 shows the analytical results for inorganic parameters (cadmium, total and hexavalent chromium, copper, and pH) during the January 1998 sampling event.

Hexavalent Chromium (Cr^{+6})

During the January 1998 sampling, hexavalent chromium was detected by EPA Method 7196 in one on-site well. The hexavalent chromium concentrations detected by EPA Method 218.6 are included in Table 6-4. Well MW-04 had a concentration of 39.2 mg/L, an decrease from the October 1997 result (73.8 mg/L). Figure 6-4 shows the concentration of hexavalent chromium detected in the shallow wells on-site during the January 1998 sampling. The water purged from MW-04 has typically been bright yellow in color since CDM began sampling the wells on a quarterly basis in January 1989. During the January 1998 sampling round, the color of water from MW-04 was again noted as yellow. Figure 6-5 shows the concentrations of hexavalent chromium and groundwater elevations in MW-04 over time.

The concentrations of hexavalent chromium at MW-04 generally decreased from July 1989 (120 mg/L) to April 1993 (1.8 mg/l), while groundwater elevations increased. Since April 1993, hexavalent chromium concentrations have fluctuated up and down while groundwater elevations have remained fairly constant. Historically, hexavalent chromium has been detected in two wells other than MW-04, although the highest concentration has always been detected at MW-04. At MW-14S from October 1990 to January 1993, hexavalent chromium concentrations generally decreased, with analytical non-detections reported for the last six sampling rounds previous to October 1994 and seven of the 13 sampling rounds since then. In MW-09, hexavalent chromium concentrations decreased between October 1989 and January 1991 and except for a trace amount detected in October 1991, hexavalent chromium concentrations have been below detection limits ever since. A trace level (i.e., approximately 2.5 times the method detection limit) of hexavalent chromium was detected in MW-15S for the first time during the January 1995 sampling event. Because hexavalent chromium was not detected in well MW-15S during subsequent sampling events, nor during 17 sampling events previous to January 1995, the low concentration detected during January 1995 is probably anomalous.

Total Chromium (Cr[T])

Total chromium was detected above the detection limit in five monitoring wells during the January 1998 sampling event. The highest concentration detected was 44.0 mg/L in MW-04. Wells MW-04A, MW-07, MW-14S and MW-15S had minor concentrations ranging from 0.021 mg/L to 0.018 mg/L. Figure 6-6 shows the concentrations of total chromium detected in shallow monitoring wells during January 1998. Figure 6-7 shows the concentrations of total chromium and corresponding groundwater elevations in MW-04 over time.

Comparison of historical total chromium data with present data (Table 6-1) indicates that total chromium concentrations, like those of hexavalent chromium, generally decreased from January 1989 to April 1993, and have fluctuated up and down since April 1993. Historically, the highest total chromium concentrations have been detected in MW-04. Sporadic detections of total chromium close to the detection limit have occurred historically in nearly all shallow wells on site.

TABLE 6-4
PHIBRO-TECH, INC.
January 1998 Quarterly Monitoring Well Sampling
Inorganic Analytical Results
(mg/L)

Well Identification	Cadmium	Chromium (Hexavalent)		Chromium (Total)	Copper	pH
	EPA- 6010-A	EPA- 7196	EPA- 218.6	EPA- 6010-A	EPA- 6010-A	EPA- 9040
PTI- MW01S	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**6.7**
PTI- MW01D	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**7.4**
PTI- MW03	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**7.2**
PTI- MW04	**0.53**	**39.2**	NA	**44.0**	ND < 0.020	**6.9**
PTI- MW04A	ND < 0.0050	ND < 0.020	**0.0176**	**0.020**	ND < 0.020	**7.7**
PTI- MW06B	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**7.3**
PTI- MW06D	ND < 0.0050	ND < 0.020	NA	ND < 0.010	**0.024**	**7.4**
PTI- MW07	ND < 0.0050	ND < 0.020	NA	**0.010**	**0.044**	**6.7**
PTI- MW09	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**6.9**
PTI- MW11	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**7.1**
PTI- MW14S	ND < 0.0050	ND < 0.020	**0.0103**	**0.018**	**0.020**	**7.3**
PTI- MW15S	ND < 0.0050	ND < 0.020	**0.0177**	**0.021**	ND < 0.020	**7.4**
PTI- MW15D	ND < 0.0050	ND < 0.020	**0.00457**	ND < 0.010	ND < 0.020	**7.6**
PTI- MW16	ND < 0.0050	ND < 0.020	NA	ND < 0.010	ND < 0.020	**7.0**
MCL	**0.005**	—	—	**0.05**	**1**	—
SGV GW	ND	ND	ND	ND	ND-0.467	**7.9-8.5**

ND = Analytical parameter not detected.
NA = Parameter not analyzed
MW = Monitoring Well
MCL = Maximum Contaminant Limit
SGV GW = Range of concentrations in water supply wells tested in the Santa Fe Springs area in the year 1996.

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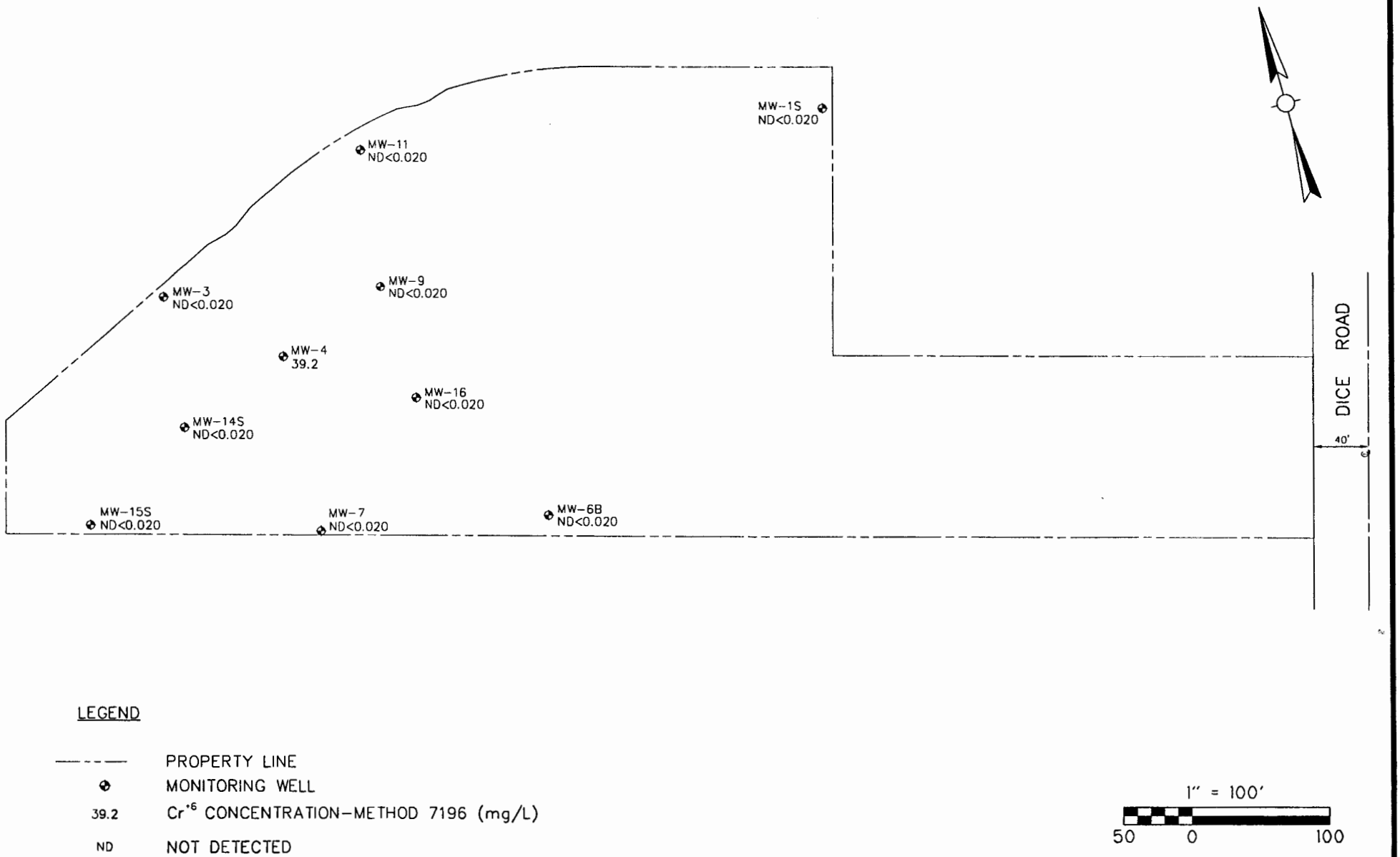

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HEXAVALENT CHROMIUM CONCENTRATIONS – SHALLOW WELLS JANUARY 1998

Figure 6-4

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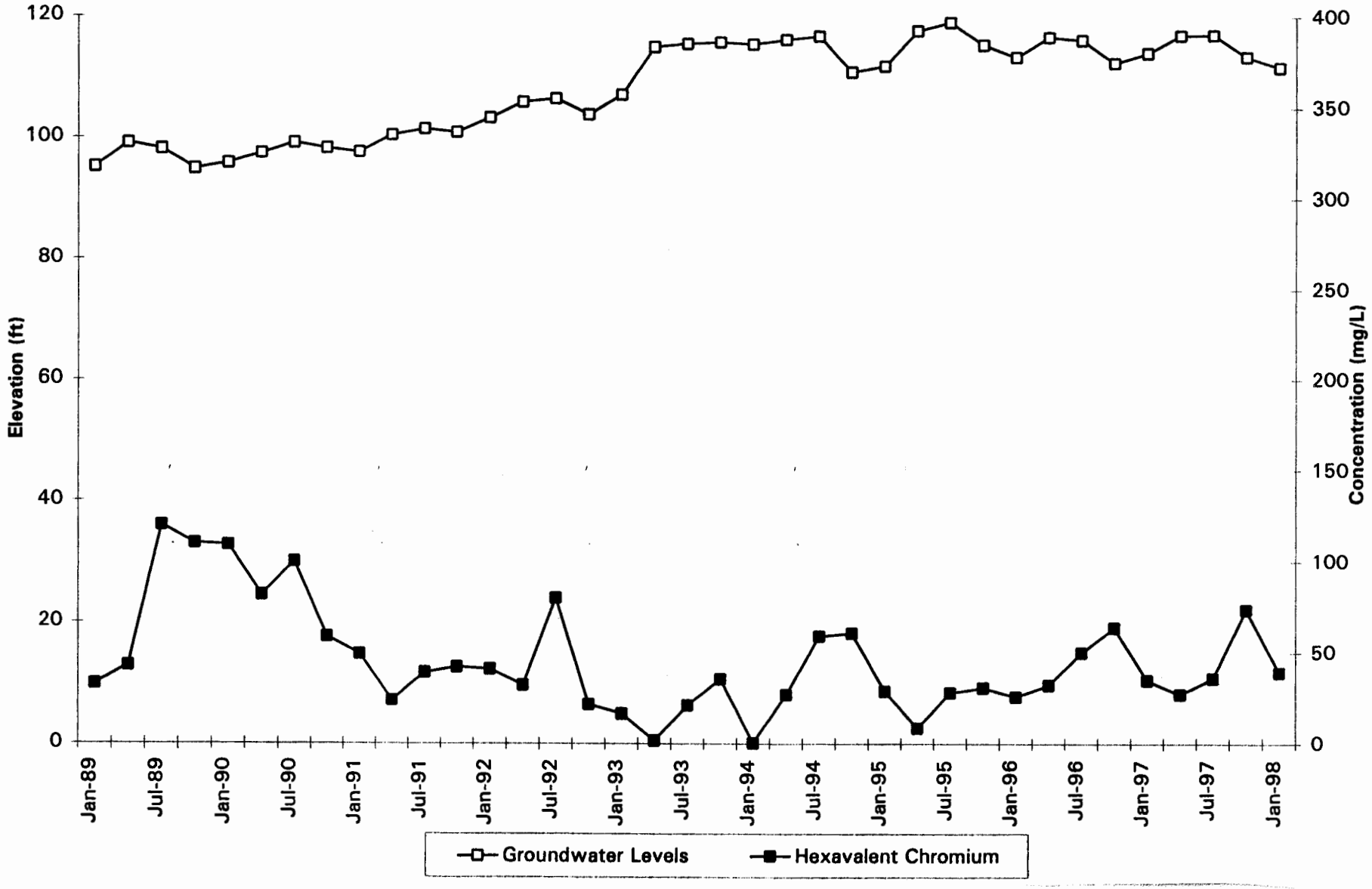

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HEXAVALENT CHROMUIM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW–04
JANUARY 1989 – JANUARY 1998

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Figure 6-5

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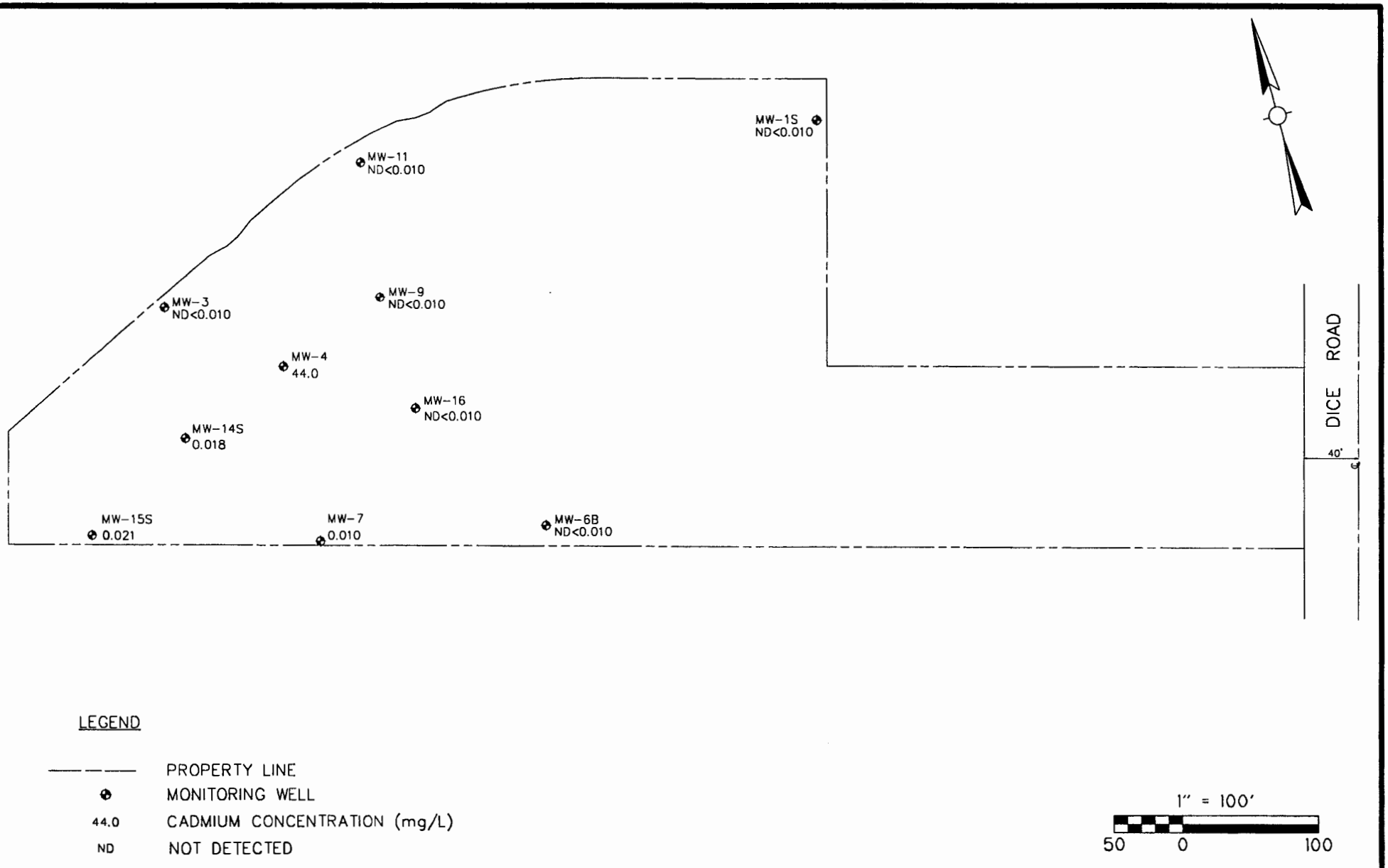

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TOTAL CHROMIUM CONCENTRATIONS – SHALLOW WELLS JANUARY 1998

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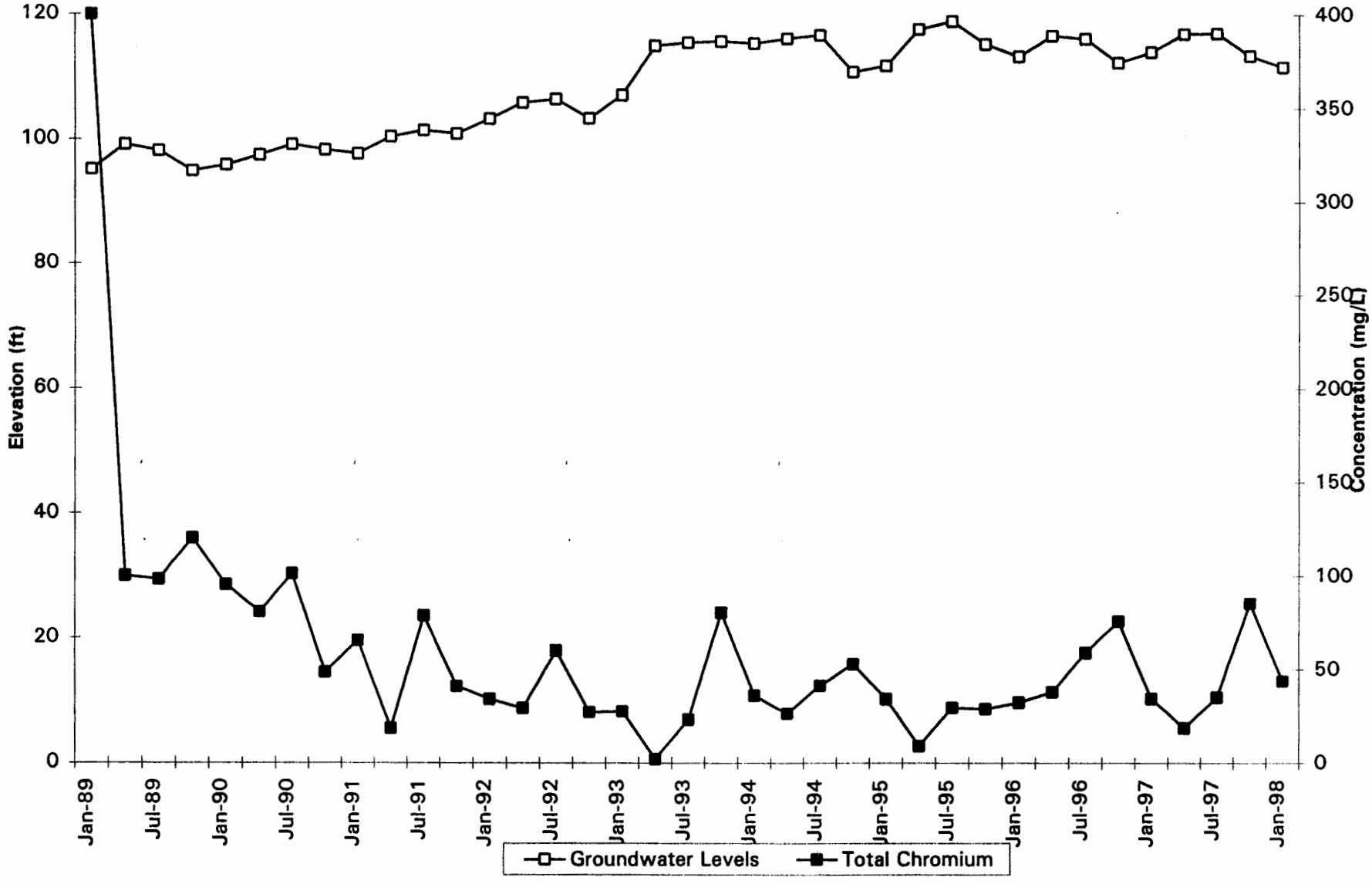
Figure 6-6

I:\2279-III\CAD\JAN-98\ JAN98-67 03/09/98 11:23:03 0:02:38 J. La Madrid



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

TOTAL CHROMUIM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW–04
JANUARY 1989 – JANUARY 1998

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Figure 6-7

Cadmium (Cd)

During the January 1998 sampling event, cadmium was detected in one on-site well. Well MW-04 had a concentration of 0.53 mg/L, a decrease from October 1997 (0.64 mg/L). Previous concentrations in MW-04 have ranged from 0.028 mg/L in January 1989 to 0.86 mg/L in July 1992. Figure 6-8 shows the cadmium concentrations detected in the on-site wells during January 1998. Figure 6-9 shows the concentrations of cadmium and corresponding groundwater elevations in MW-04 over time. As groundwater elevations have generally increased since January 1989, cadmium concentrations have also generally increased. As shown on the figure, cadmium concentrations have fluctuated considerably (i.e., from non-detectable at a detection limit of 0.005 mg/L during April 1993 to 0.86 mg/L during July 1992) since April 1990.

Cadmium has been detected historically only in well MW-04, with the exceptions of 0.01 mg/L in MW-01 during July 1989, 0.005 to 0.018 mg/L in MW-14S during October 1990 through July 1991, 0.0055 mg/L in MW-14S during July 1995, and in MW-15S at low concentrations close to the detection limit from April 1991 to January 1993. Detected concentrations in MW-15S have ranged from 0.005 mg/L in July 1992 to 0.02 mg/L during October 1991.

Copper (Cu)

Copper was detected above the detection limit in three on-site wells sampled during the January 1998 sampling event. The highest concentration of copper (0.044 mg/kg) was detected in well MW-07, an increase from October 1997 (0.025 mg/L). Copper concentrations of 0.020 mg/L and 0.024 mg/L were detected in wells MW-06D and MW-14S. Historically, with the exception of well MW-14S, elevated concentrations of copper above the MCL of 1.0 mg/L have not been detected in on-site monitoring wells. Copper concentrations detected in on-site wells during January 1998 are shown on Figure 6-10.

pH

Groundwater samples from all wells were measured for pH in the field during purging activities and also by the analytical laboratory on the samples submitted for analysis. Field pH measurements were recorded in the field log book during well purging. In January 1998, the field measurements of pH generally correlated with the values shown in Table 6-4, which range from 6.7 to 7.7.

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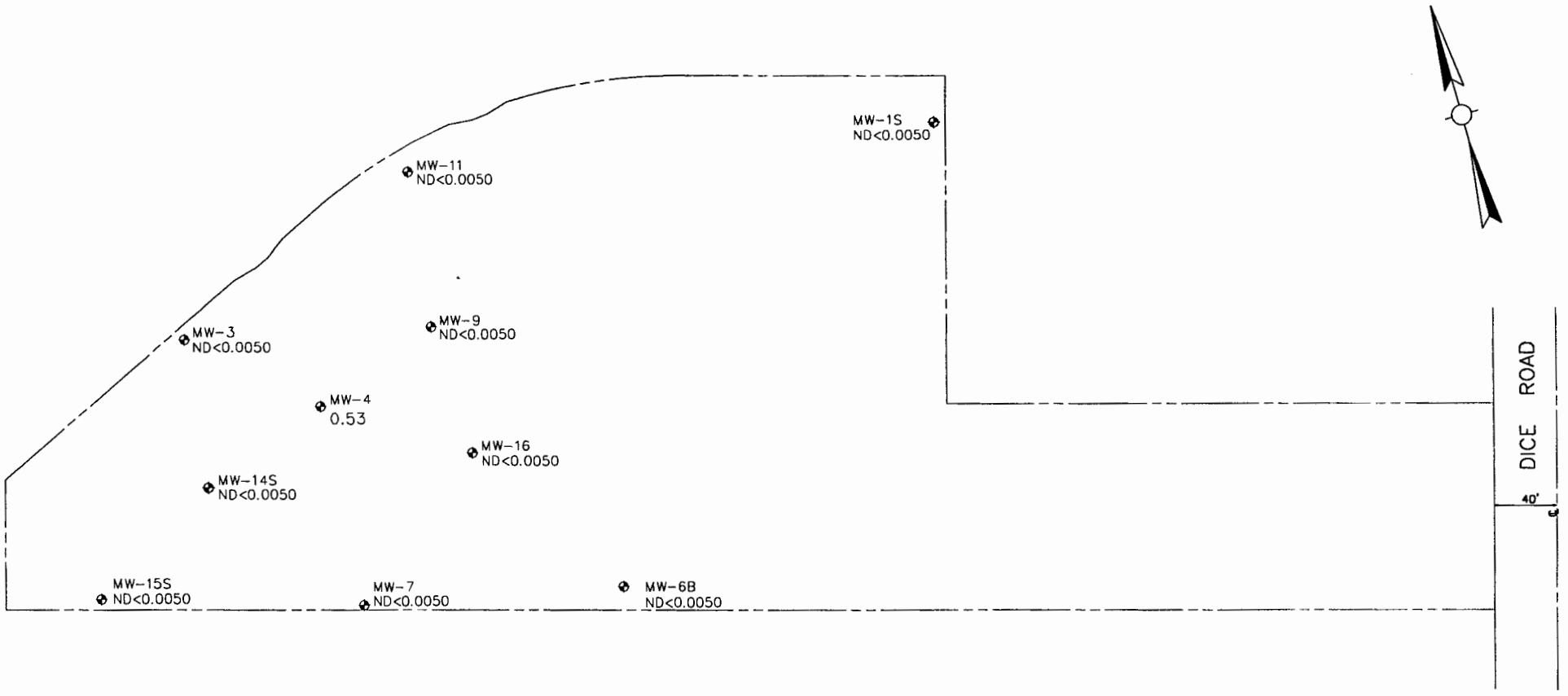

LEGEND

———	PROPERTY LINE
⊕	MONITORING WELL
0.53	CADMIUM CONCENTRATION (mg/L)
ND	NOT DETECTED

1" = 100'

50 0 100

PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

CADMIUM CONCENTRATIONS – SHALLOW WELLS JANUARY 1998

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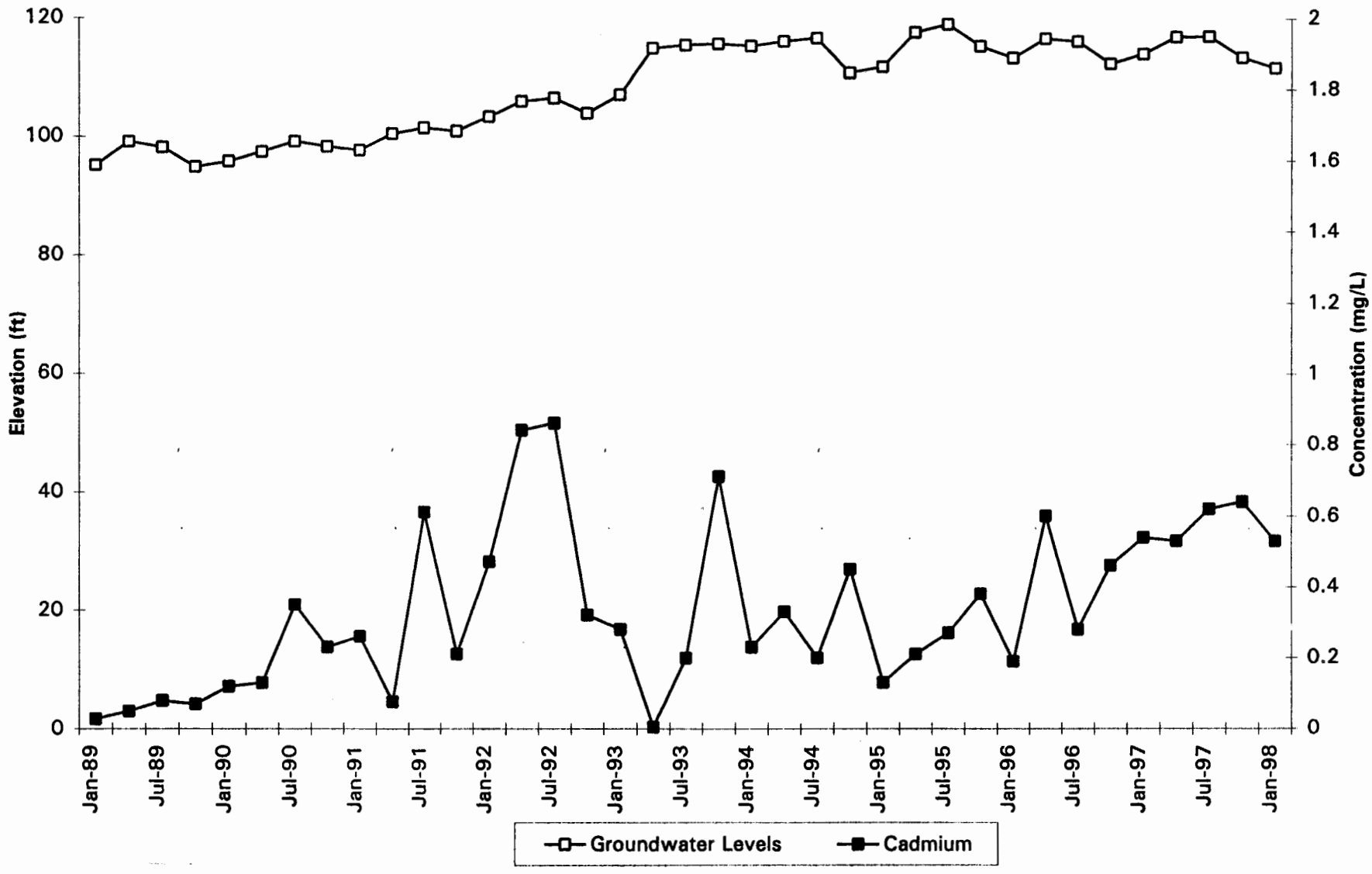
Figure 6-8



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

CADMIUM CONCENTRATIONS – GROUNDWATER ELEVATIONS
MW-04
JANUARY 1989 – JANUARY 1998

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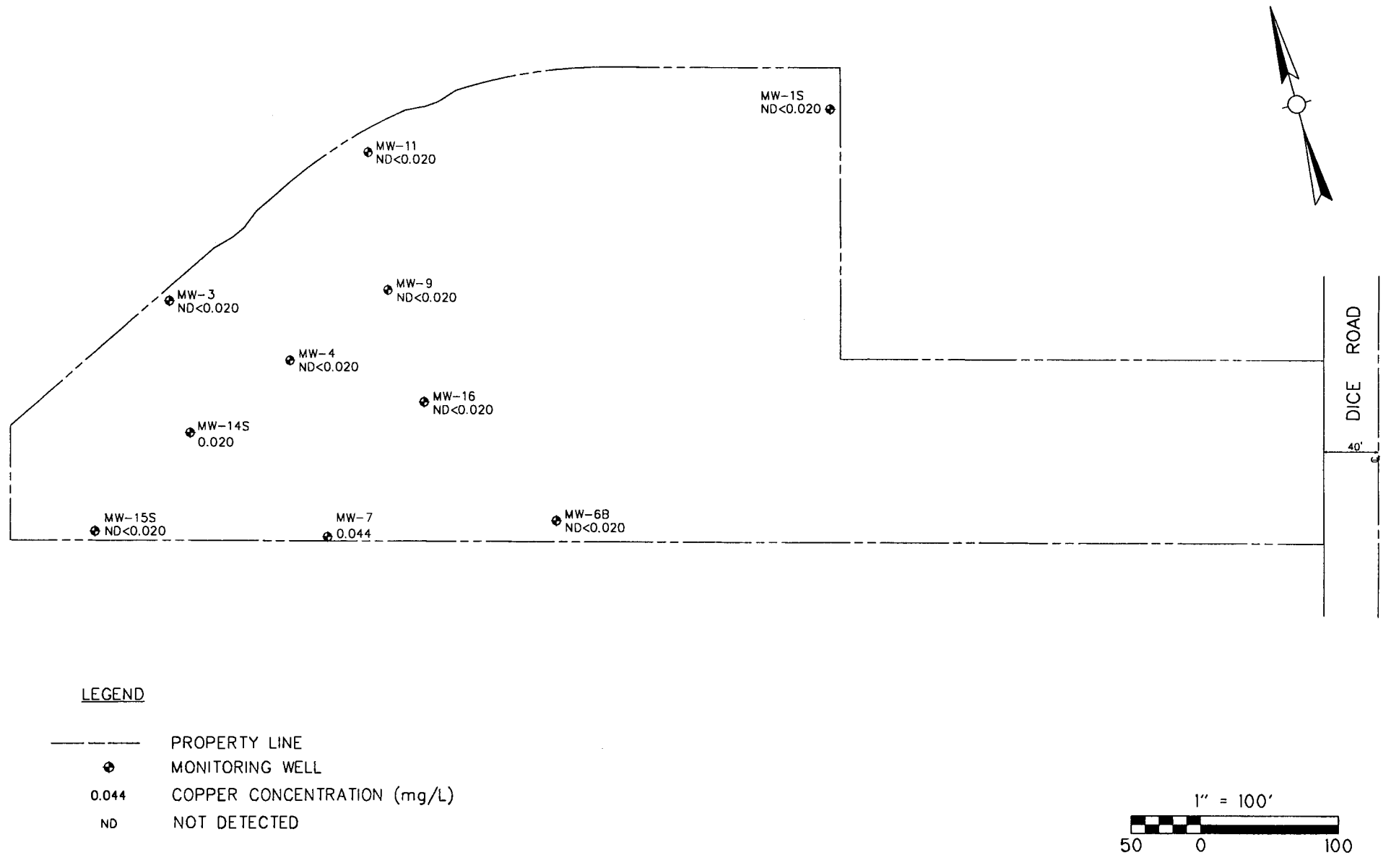
Figure 6-9

I:\2279-111\CAD\JAN-98\ JAN98610 03/10/98 10:03:36 0:19:46 J. La Madrid



PHIBRO-TECH, INC., SANTA FE SPRINGS, CA

COPPER CONCENTRATIONS – SHALLOW WELLS JANUARY 1998

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Figure 6-10

Section 7
Statistical Evaluation

The following sections contain a statistical treatment of the monitoring data designed to determine if onsite wells have been impacted by metals, BTEX compounds (benzene, toluene, ethylbenzene, xylenes) or TCE (trichloroethene). The procedures used are based on the recommendations provided in the 1989 EPA Guidance document, *Statistical Analysis of Ground-water Monitoring Data at RCRA Facilities - Interim Final Guidance* and in the 1992 Addendum document. In some instances, methods which have not been recommended in the documents cited above were used. However, unrecommended techniques were only used to supplement the recommended procedures. When statistical methods outlined in the 1989 guidance document were superseded by the 1992 Addendum, the more recent recommendations were followed.

7.1 Determination of Background Upper Tolerance Limit

Overview

The upper tolerance limit (UTL) is a method that is typically used in compliance monitoring to compare downgradient wells to established maximum contaminant levels (MCLs) or alternate contaminant levels (ACLs). In short, the UTL represents the upper end of the tolerance interval, which is calculated at a specified confidence level and coverage. For instance, a UTL with 95 percent coverage and a 95 percent confidence level represents a value which, with 95 percent confidence, will be exceeded less than 5 percent of the time.

In the present evaluation, we have calculated UTLs for the background well (MW-1S) and compared this value to each individual downgradient analytical result using a confidence level and coverage of 95 percent. When onsite wells exceed the background UTL consistently, it suggests that a significant difference from background may exist. While this is not a recommended technique for detection monitoring, we have applied background UTLs as a screening tool and as a supplement to the more rigorous statistical comparisons that follow.

Methods

Inherent in the calculation of a parametric UTL is the assumption of a normal (or log normal) data distribution. One of the tests for normality recommended in the 1992 Addendum to the EPA guidance document is the probability plot. When a dataset is normally distributed, the corresponding probability plot is linear. However, for the background well, the analyses have a high percentage of non-detects for most parameters. Therefore, the probability plots appear to be non-linear (see Appendix E-3). Fortunately, several methods are available to adjust the mean and standard deviation (used in the calculation of the UTL) based on various treatment of non-detects that allow the use of a parametric UTL. In a parametric UTL, the magnitude of the analyses are considered, while in a nonparametric analysis, the data is ranked from highest to lowest and the UTL is calculated from the ranks. The choice of method depends on the percentage of non-detects in the population and on comparison of special probability plots designed to test the assumptions built into each model. Parametric methods for determination of the UTL are described below. When the percentage of non-detects is above 90 percent, the UTL is calculated using a nonparametric method employing the Poisson model. In the Poisson model, detected values are

treated as "rare events," such that the probability of occurrence is low, but constant. The model takes into account both the frequency of occurrence of detected values as well as the magnitude. Since the Poisson model is nonparametric, a normal or log normal data distribution is not required.

When the frequency of detect is greater than 10 percent and data are normally or log normally distributed, either the Atchison or Cohen adjustment is recommended. In the Atchison method, non-detects are assumed to equal zero, and therefore are not considered in the data distribution. In the Cohen adjustment, non-detects are assumed to have finite values between zero and the detection limit. Experience at the EPA and USGS (EPA 1992) have shown that, in general, when the frequency of detect (FOD) is between 10 and 50 percent, Atchison's method is more valid; while between 50 and 90 percent FOD, Cohen's method is more valid. However, this is only a rule of thumb that should be verified periodically using the detects-only and censored probability plot method described above.

Results

The frequencies of detection for each parameter in the background well (MW-1S) is provided in Table 7-1 of the October 1997 report. For hexavalent chromium, cadmium, and benzene, the FOD was less than 10 percent and the Poisson nonparametric method was used to calculate the UTL. Total chromium, copper, toluene, ethylbenzene, and total xylenes analyses were all between 10 and 50 percent FOD, suggesting that the Atchison adjustment should be employed before calculating the UTL. For trichloroethene (TCE), the data were log normally distributed (see Appendices E-2 and E-3 of the October 1997 report) and the FOD was 100 percent; therefore, no adjustment was required, and the UTL was calculated directly.

The results of the UTL calculations and the comparison with each onsite well are presented in Table 7-2. Based on the number of analyses above the UTL for each onsite well, MW-3, MW-4, MW-7, MW-9, and MW-11 appear to differ from background with respect to the BTEX compounds. MW-4, MW-9, and MW-14S also appear to differ from background with respect to total chromium and copper. Note that the comparison of background UTLs to onsite wells described above is not definitive and will only be used in conjunction with the more in-depth statistical approaches that follow.

7.2 Comparison of Background and Onsite Wells

Overview

The recommended method for comparing onsite wells to background is the analysis of variance (ANOVA). There are two types of ANOVA — parametric and nonparametric. In order to use the parametric ANOVA, the dataset must be normally or log normally distributed and the group variances must be equal. For the nonparametric approach, neither normality or equal variances are required, however, slightly larger datasets are needed to use a nonparametric method compared to the parametric ANOVA. The minimum number of analyses for the nonparametric test is 9, while for the parametric test, only 6 are required (EPA 1989).

The first assumption (normal or log normal distribution) should be tested using either the Shapiro-Wilk or probability plot method when the sample size is 50 or less. In general, the Shapiro-Wilk test

Table 7-1
Percent of Total Samples in Shallow Wells Reported Above the Detection Limit
Quarterly Data: January 1989 to January 1998 at Philbro-Tech, Inc.

Parameter	*MW-1S*	*MW-3*	*MW-4*	*MW-6B*	*MW-7*	*MW-9*	*MW-11*	*MW-14S*	*MW-15S*	*MW-16*
Number Samples (n)	37	37	37	33	37	36	37	29	30	24
Metals (mg/L) (%)										
Hexavalent chromium	2.7	2.7	100.0	0	2.7	21.6	2.7	51.7	3.3	0
Total chromium	13.5	8.1	97.3	33.3	24.3	35.1	13.5	86.2	33.3	8.3
Cadmium	2.7	0	97.3	0	2.7	2.7	0	20.7	23.3	0
Copper	24.3	13.5	35.1	6.1	40.5	10.8	24.3	55.2	16.7	12.5
Aromatics (µg/L) (%)										
Benzene	2.7	13.5	16.2	0	21.6	5.4	0	13.8	0	0
Toluene	11.1	19.4	41.7	40.6	16.7	44.4	44.4	25.0	34.5	26.1
Ethylbenzene	32.4	54.0	83.8	42.4	48.7	73.0	89.2	72.4	50.0	79.2
Total xylenes	37.8	48.7	86.5	48.5	35.1	64.9	73.0	58.6	50.0	54.2
Halocarbons (µg/L) (%)										
Trichloroethene	100.0	97.3	91.9	100.0	100.0	91.9	94.6	100.0	96.7	100.0

% = Percent detected

Table 7-2
Definition of Upper Tolerance Levels in Background Shallow Wells
Quarterly Data: January 1989 to January 1998 at Philbro-Tech, Inc.

Parameter	% Detected in Bkgd [1]	Tolerance Limit Method	Upper Tolerance Limit [2]	Upper Tolerance Limit Exceeded								
				MW-3 36 [3]	MW-4 36	MW-6B 32	MW-7 36	MW-9 36	MW-11 36	MW-14S 28	MW-15S 29	MW-16 23
Metals (mg/L)												
Hexavalent chromium	2.7	P	0.26	1	37[4]	–	–	4	–	4	–	–
Total chromium	13.5	A	0.049	2	37 (1)	1	2	10	–	14 (1)	–	–
Cadmium	2.7	P	0.18	–	28	–	–	–	–	–	–	–
Copper	24.3	A	0.03	4 (1)	10 (3)	3 (1)	10 (2)	3 (1)	6 (1)	10	4	3
Aromatics (µg/L)												
Benzene	2.7	P	1.35	9 (7)[5]	23 (21)	1 (1)	5 (4)	25 (23)	16 (16)	3 (3)	1 (1)	9 (9)
Toluene	11.1	A	1.52	14 (7)	28 (13)	11 (1)	9 (6)	27 (11)	27 (11)	7 (2)	9	15 (10)
Ethylbenzene	32.4	A	2.01	16 (3)	32 (2)	12 (1)	15 (3)	30 (4)	33 (2)	20	13	19 (2)
Total xylenes	37.8	A	7.55	10 (3)	33 (3)	7	4 (1)	24 (1)	22 (2)	8	7	12 (4)
Halocarbons (µg/L)												
Trichloroethene	100.0	T	17.90	28 (1)	37 (3)	10	36	36 (3)	35	28	2	22

1 MW-1S is background shallow well, n = 37
2 In ppm or ppb, as noted for groups
3 Number of samples collected at corresponding well
4 Number of samples that exceed upper tolerance level at corresponding well
5 (6) number of samples exceeding limit that are reported as ND
– = None of samples exceeded the upper tolerance limit
P = Poisson
A = Aitchison adjusted
T = Unadjusted limit

is much more stringent than the probability plot since the method tends to focus on the "tails" of the distribution. The Lillifors, while not recommended in the Addendum, was suggested in the Interim Final Guidance (EPA 1989) and has been included for comparative purposes.

The test for equal group variances suggested in the Addendum to the Interim Final Guidance (EPA 1992) is the box plot. In a box plot, the extents of each box represent the 25th and 75th percentiles of the dataset. Therefore, a long box tends to represent a larger variance than a short box. EPA (1992) recommends using a nonparametric ANOVA if the length of the largest box is equal to or greater than three times that of the smallest box. Another suggested criteria for a parametric ANOVA is a combined FOD, for both the background and the onsite well under consideration, of greater than 50 percent.

Methods

Normality tests were performed only for TCE, since for the other parameters, the combined FOD was <50 percent, precluding the use of the parametric ANOVA method. Results of the probability plot, and Shapiro-Wilk tests are presented in the October 1997 report in Table 7-3, while the raw data are in Appendices E-2 and E-3, respectively. Due to the stringent nature of the Shapiro-Wilk test, less weight was given to this test than the probability plots when conflicting results were obtained. Based on Table 7-3 of the October 1997 report, TCE data are log normal in all wells except MW-3, MW-6B, and MW-11. The log normal data distribution is typical of environmental datasets where various degrees of dilution have occurred. The lack or normality or log normality precluded the use of a parametric ANOVA for wells MW-3 MW-4, and MW-9.

In order to test the equal group variances assumption, box plots were constructed for TCE in each well (see Appendix E-4 of the October 1997 report). The results indicate that the background box is less than ⅓ the length of the box for well MW-6B, indicating that this well cannot be compared to background using a parametric ANOVA. However, all other wells met the equal variance requirement.

A summary of the ANOVA method used is as follows:

- MW-4, MW-7, MW-11, MW-14S, MW-15S, and MW-16 for TCE — parametric ANOVA using ½ D.L. for non-detects
- All other parameters and wells — Nonparametric, Kruskal Wallis Mann Whitney U Test

Note that ½ D.L. was used when the FOD was greater than 85 percent in a single well.

Results

The results of the nonparametric and parametric ANOVA tests are included in Appendices E-2 and E-3, respectively, while a summary is provided in Table 7-3. An " R" indicates that the null hypothesis was rejected, or that the two wells are not the same, while an "A" indicates the null hypothesis was accepted. In general, the results are similar to the UTL comparisons; except well MW-16 appears to differ from background with respect to the BTEX compounds.

Table 7-3
Comparison of Background and Onsite Shallow Wells
Quarterly Data: January 1989 to January 1998 at Phibro-Tech, Inc.

Parameter	*MW-3*	*MW-4*	*MW-6B*	*MW-7*	*MW-9*	*MW-11*	*MW-14S*	*MW-15S*	*MW-16*
Metals (mg/L)									
Hexavalent chromium[1]	A	R	A	A	A	A	R	A	A
Total chromium[1]	A	R	R	A	R	A	R	A	A
Cadmium[1]	A	R	A	A	A	A	A	A	A
Copper[1]	A	A	A	A	A	A	R	A	A
Aromatics (µg/L)									
Benzene[1]	R	R	A	R	R	R	R	A	R
Toluene[1]	R	R	A	R	R	R	R	A	R
Ethylbenzene[1]	R	R	A	R	R	R	R	A	R
Total xylenes[1]	R	R	A	A	R	R	A	A	R
Halocarbons (µg/L)									
Trichloroethene[2]	R[3]	R[4]/R[5]	A[3]	R[3]	R/R	R[3]	R/R	R/R	R/R

1 Background to onsite comparison by Mann Whitney U Method, using DL for ND, @ 95 percent confidence level
2 Background to onsite comparison by one way ANOVA Method using one-half DL for ND
3 Nonparametric comparison used for TCE
4 Normal Distribution used in comparison
5 Log normal Distribution used in comparison
A = Null Hypothesis, that means are equal, is accepted
R = Null Hypothesis, that means are equal, is rejected
R/R = Null Hypothesis, rejected using parametric (top letter) and nonparametric (bottom letter) tests

The results for TCE were obtained using both the normal and log normal assumptions for comparative purposes. The results indicate that, regardless of the data distribution, only well MW-6B was the same as background with respect to TCE. These results are identical to those obtained last quarter.

Section 8
Assessment of Quarterly Groundwater Monitoring Program Status

In the October 1990 groundwater monitoring report, changes in the quarterly groundwater sampling program were proposed. These changes were first implemented during the April 1991 sampling event and included reducing the number of wells sampled and parameters analyzed in each well. The current groundwater sampling program will only be used as an interim groundwater sampling program, until a remediation alternative from the Corrective Measures Study (CMS) has been selected by EPA.

The analytical parameters for the January 1998 quarterly monitoring were as follows:

Wells	*Purgeable Halogenated/ Aromatic Organics (EPA 8260)*	*Chromium, Cadmium, Copper*	*Hexavalent Chromium*	*pH*
MW-01S, MW-01D	X	X	X	X
MW-03, MW-04A	X	X	X	X
MW-11 MW-06B	X	X	X	X
MW-06D, MW-07	X	X	X	X
MW-09, MW-04	X	X	X	X
MW-14S, MW-15S	X	X	X	X
MW-15D, MW-16	X	X	X	X

Beginning with the January 1997 sampling event, EPA Method 8010/8020 was replaced with EPA Method 8260. This change was requested by the analytical laboratory, which no longer performs 8010/8020 analysis. Methyl tertiary butyl ether (MTBE) analysis was performed once, in January 1997. Since there were no detections of MTBE in any of the groundwater samples, this analysis was discontinued.

Statistical analysis has been conducted annually. Beginning with the October 1993 sampling event, statistical analysis has been performed on a quarterly basis, as requested by DTSC.

The proposed April 1998 quarterly monitoring includes sampling the 14 wells for purgeable halogenated/aromatic organics using EPA Method 8260, chromium, cadmium, copper, hexavalent chromium, and pH. The water levels at the 14 wells sampled, in addition to the remaining unsampled wells, will also be measured.

Section 9
References

Camp Dresser & McKee Inc., Groundwater Modeling Study, Southern California Chemical, January 1993.

_____, RCRA Facility Investigation Work Plan Addendum, Southern California Chemical, February 13, 1992, Revised March 6, 1992.

_____, RCRA Facility Investigation Report, Southern California Chemical, December 6, 1991.

_____, RCRA Facility Investigation Work Plan, Southern California Chemical, June 26, 1990.

_____, Current Conditions Report, Southern California Chemical, June 8, 1990.

City of Santa Fe Springs, 1996 Annual Water Quality Report, 1996.

J.H. Kleinfelder & Associates, Quality Assurance Project Plan, Southern California Chemical, May 1988.

_____, Draft Environmental Assessment, Southern California Chemical, January 1986.

Appendix A
General Analytical Detection Limits

TABLE A-1
PHIBRO-TECH, INC.
HEAVY METALS AND INORGANICS ANALYSIS
Typical Detection Limits

Method Number	Analytical Parameter	Detection Limit	Units
EPA 6010-L	Antimony	0.06	mg/L
EPA 6010-L	Barium	0.01	mg/L
EPA 6010-L	Beryllium	0.002	mg/L
EPA 6010-L	Cadmium	0.005	mg/L
EPA 6010-L	Chromium	0.01	mg/L
EPA 6010-L	Cobalt	0.01	mg/L
EPA 6010-L	Copper	0.02	mg/L
EPA 6010-L	Lead	0.05	mg/L
EPA 6010-L	Molybdenum	0.02	mg/L
EPA 6010-L	Nickel	0.04	mg/L
EPA 6010-L	Silver	0.01	mg/L
EPA 6010-L	Thallium	0.5	mg/L
EPA 6010-L	Tin	0.1	mg/L
EPA 6010-L	Vanadium	0.01	mg/L
EPA 6010-L	Zinc	0.02	mg/L
EPA 7196	Chromium, Hexaval	0.02	mg/L
EPA 7061-L	Arsenic	0.005	mg/L
EPA 9012	Cyanide, Total	0.01	mg/L
EPA 7470	Mercury	0.001	mg/L
EPA 300.0	Chloride	5	mg/L
EPA 300.0	Nitrate	0.2	mg/L
EPA 7741-L	Selenium	0.1	mg/L
EPA 376.2	Sulfide, as Sulfur	1.2	mg/L

TABLE A-2
PHIBRO-TECH, INC.
VOLATILE ORGANIC COMPOUNDS
Typical Detection Limits

Method Number	Analytical Parameter	Detection Limit	Units
EPA 8260	Benzene	0.5	µg/L
EPA 8260	Toluene	1.0	µg/L
EPA 8260	Ethylbenzene	1.0	µg/L
EPA 8260	Xylenes, Total	1.0	µg/L
EPA 8260	Chloromethane	1.0	µg/L
EPA 8260	Bromomethane	1.0	µg/L
EPA 8260	Vinyl Chloride	1.0	µg/L
EPA 8260	Chloroethane	1.0	µg/L
EPA 8260	Methylene Chloride	1.0	µg/L
EPA 8260	Trichlorofluoromethane	1.0	µg/L
EPA 8260	1,1-Dichloroethene	1.0	µg/L
EPA 8260	1,1-Dichloroethane	1.0	µg/L
EPA 8260	trans-1,2-Dichloroethene	1.0	µg/L
EPA 8260	Chloroform	1.0	µg/L
EPA 8260	1,2-Dichloroethane	1.0	µg/L
EPA 8260	1,1,1-Trichloroethane	1.0	µg/L
EPA 8260	Carbon Tetrachloride	1.0	µg/L
EPA 8260	Bromodichloromethane	1.0	µg/L
EPA 8260	1,2-Dichloropropane	1.0	µg/L
EPA 8260	trans-1,3-Dichloropropen	1.0	µg/L
EPA 8260	Trichloroethene	1.0	µg/L
EPA 8260	Dibromochloromethane	1.0	µg/L
EPA 8260	1,1,2-Trichloroethane	1.0	µg/L
EPA 8260	cis-1,3-Dichloropropene	1.0	µg/L
EPA 8260	2-Chloroethylvinyl ether	1.0	µg/L
EPA 8260	Bromoform	1.0	µg/L
EPA 8260	Tetrachloroethene	1.0	µg/L
EPA 8260	1,1,2,2-Tetrachloroethan	1.0	µg/L
EPA 8260	Chlorobenzene	1.0	µg/L
EPA 8260	1,2-Dichlorobenzene	1.0	µg/L
EPA 8260	1,3-Dichlorobenzene	1.0	µg/L
EPA 8260	1,4-Dichlorobenzene	1.0	µg/L

Appendix B
Quanterra Analytical Reports

WEST COAST ANALYTICAL SERVICE, INC.

PHIBRO-TECH, INC.
Attn: Ed Vigil

Job No: 37066
January 23, 1998

LABORATORY REPORT

Hexavalent Chromium by EPA 218.6

Sample ID	Parts Per Billion (ug/L)
PTI-MW14S-038	10.3
PTI-MW15S-038	17.7
PTI-MW15D-038	4.57
Detection Limit:	0.01

Date Analyzed: 1-15-98

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Sample:BATCH QC
Matrix:Water

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Hexavalent Chromium	17.6	20	39.3	109	37.5	100	5

QC Limits

Analyte	RPD Control	% Recovery Control
Hexavalent Chromium	13	74 - 117

WCAS

WCAS
WEST COAST
ANALYTICAL
SERVICE, INC.
Analytical Chemists

January 23, 1998

PHIBRO-TECH, INC.
8851 Dice Road
Santa Fe Springs, CA 90670

Attn: Ed Vigil

Job No: 37049 S

LABORATORY REPORT

Samples Received: One (1) Liquid
Date Received: 01/15/98
Purchase Order No: 05298

The sample was analyzed as follows:

Analysis	Page
Hexavalent Chromium by EPA 218.6	2

CC: Sharon Wallin
Camp, Dresser & McKee, Inc.
1881 Von Karmen
Suite 650
Irvine, CA 92715

Charles Jacks, Ph. D.
Senior Staff Chemist

B. Michael Hovanec
Senior Staff Chemist

9840 Alburtis Avenue • Santa Fe Springs, CA 90670 • 562•948•2225 • FAX 562•948•5850 • http://www.wcaslab.com

WCAS
WEST COAST
ANALYTICAL
SERVICE, INC.
Analytical Chemists

January 23, 1998

PHIBRO-TECH, INC.
8851 Dice Road
Santa Fe Springs, CA 90670

Attn: Ed Vigil

Job No: 37066 S

LABORATORY REPORT

Samples Received: Three (3) Liquids
Date Received: 01/15/98
Purchase Order No: 05298

The samples were analyzed as follows:

CC: Sharon Wallin
Camp, Dresser & McKee, Inc.
1881 Von Karmen
Suite 650
Irvine, CA 92715

Charles Jacks, Ph. D.
Senior Staff Chemist

B. Michael Hovanec
Senior Staff Chemist

9840 Alburtis Avenue • Santa Fe Springs, CA 90670 • 562•948•2225 • FAX 562•948•5850 • http://www.wcaslab.com

WEST COAST ANALYTICAL SERVICE, INC.

PHIBRO-TECH, INC.
Attn: Ed Vigil

Job No: 37049
January 23, 1998

LABORATORY REPORT

Hexavalent Chromium by EPA 218.6

Sample ID	Parts Per Billion (ug/L)
PTI-MW04A-038	17.6
Detection Limit:	0.01

Date Analyzed: 1-15-98

Matrix Spike/Matrix Spike Duplicate Recovery Summary

Sample: PTI-MW04A-038
Matrix: Water

Analyte	Sample Result	Amount Spiked	MS Result	% Rec MS	MSD Result	% Rec MSD	RPD
Hexavalent Chromium	17.6	20	39.3	109	37.5	100	5

QC Limits

Analyte	RPD Control	% Recovery Control
Hexavalent Chromium	13	74 - 117

WCAS

Quanterra Environmental Services

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

February 11, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: 130200
PO/CONTRACT: 2279-11463-110.FLD

Sharon Wallin
Camp, Dress & McKee
18881 Von Karman, Suite 650
Irvine, CA 92612

Dear Ms. Wallin,

This report contains the analytical results for the four samples received under chain of custody by Quanterra Incorporated on January 13, 1998. These samples are associated with your Phibro-Tech Inc. project.

The case narrative is an integral part of this report.

Preliminary results were sent via facsimile for metals and general chemistry on January 26, 1998 and for VOC's on February 2, 1998.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Diane Suzuki
Project Manager

TABLE OF CONTENTS

QUANTERRA INCORPORATED PROJECT NUMBER 130200

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 130200

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met project and/or method-specified acceptance criteria. Any matrix-related anomalies are indicated using footnotes within the report. Any other anomalies are reported within the narrative.

There were no anomalies associated with this project.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

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SAMPLE DESCRIPTION INFORMATION
for
Phibro-Tech, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
130200-0001-SA	PTI-MW015-038 S	AQUEOUS	13 JAN 98	14:05	13 JAN 98
130200-0002-SA	PTI-MW010-038 D	AQUEOUS	13 JAN 98	14:50	13 JAN 98
130200-0003-SA	PTI-MW03-038	AQUEOUS	13 JAN 98	15:50	13 JAN 98
130200-0004-TB	PTI-TB01-038	AQUEOUS	13 JAN 98		13 JAN 98

VOC's

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW015-038		
LAB ID:	130200-0001-SA		
Matrix:	AQUEOUS	Sampled: 13 JAN 98	Received: 13 JAN 98
Authorized:	13 JAN 98	Prepared: 21 JAN 98	Analyzed: 21 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	1.0		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	12		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	92	%	80 - 120
Toluene-d8	99	%	80 - 120
Bromofluorobenzene	105	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW010-038		
LAB ID:	130200-0002-SA		
Matrix:	AQUEOUS	Sampled: 13 JAN 98	Received: 13 JAN 98
Authorized:	13 JAN 98	Prepared: 22 JAN 98	Analyzed: 22 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	1.1		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.8		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	3.0		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	86	%	80 - 120
Toluene-d8	96	%	80 - 120
Bromofluorobenzene	98	%	80 - 120

ND = Not Detected

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Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW03-038		
LAB ID:	130200-0003-SA		
Matrix:	AQUEOUS	Sampled: 13 JAN 98	Received: 13 JAN 98
Authorized:	13 JAN 98	Prepared: 22 JAN 98	Analyzed: 22 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	27		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	19		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	2.0		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	3.2		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	1.3		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.6		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	25		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	82	%	80 - 120
Toluene-d8	98	%	80 - 120
Bromofluorobenzene	105	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-TB01-038		
LAB ID:	130200-0004-TB		
Matrix:	AQUEOUS	Sampled: 13 JAN 98	Received: 13 JAN 98
Authorized:	13 JAN 98	Prepared: 21 JAN 98	Analyzed: 21 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	87	%	80 - 120
Toluene-d8	97	%	80 - 120
Bromofluorobenzene	104	%	80 - 120

ND = Not Detected

Quanterra
Environmental
Services

QC LOT ASSIGNMENT REPORT - MS QC
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130200-0001-SA	AQUEOUS	Q8260-A		21 JAN 98-BCX	23 JAN 98-BC
130200-0002-SA	AQUEOUS	Q8260-A		21 JAN 98-BCX	23 JAN 98-BC
130200-0003-SA	AQUEOUS	Q8260-A		22 JAN 98-BCX	23 JAN 98-BC
130200-0004-TB	AQUEOUS	Q8260-A		21 JAN 98-BCX	23 JAN 98-BC

Quanterra
Environmental Services

METHOD BLANK REPORT
Volatile Organics by GC/MS
Project: 130200

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL
Matrix: AQUEOUS
QC Run: 21 JAN 98-BCX Date Analyzed: 21 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	83	80 -120
Toluene-d8	98	80 -120
Bromofluorobenzene	104	80 -120

ND = Not Detected

Quanterra
Environmental
Services

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 130200

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 22 JAN 98-BCX Date Analyzed: 22 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	86	80 -120
Toluene-d8	110	80 -120
Bromofluorobenzene	115	80 -120

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS
Project: 130200

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 22 JAN 98
QC Run: 22 JAN 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	10.6	106	70-120
Trichloroethene	10.0	10.6	106	80-120
Benzene	10.0	9.20	92	80-120
Toluene	10.0	11.3	113	80-120
Chlorobenzene	10.0	11.5	115	80-120
Surrogates				
1,2-Dichloroethane-d4	10.0	8.04	80	80-120
Bromofluorobenzene	10.0	11.4	114	80-120
Toluene-d8	10.0	10.5	105	80-120

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 21 JAN 98
QC Run: 21 JAN 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
1,1-Dichloroethene	10.0	10.2	102	70-120
Trichloroethene	10.0	9.87	99	80-120
Benzene	10.0	8.99	90	80-120
Toluene	10.0	8.44	84	80-120
Chlorobenzene	10.0	8.56	86	80-120
Surrogates				
1,2-Dichloroethane-d4	10.0	8.59	86	80-120
Bromofluorobenzene	10.0	8.89	89	80-120
Toluene-d8	10.0	10.3	103	80-120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Volatile Organics by GC/MS
Project: 130200

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS
Sample: 130200-0002
MS Run: 23 JAN 98-BC
Units: ug/L

Analyte	Concentration Sample Result	MS Result	MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
1,1-Dichloroethene	ND	11.2	11.5	10.0	112	115	2.7	70-120	25
Trichloroethene	2.98	13.1	13.4	10.0	101	104	2.2	80-120	25
Benzene	ND	9.72	9.95	10.0	97	100	2.3	80-120	25
Toluene	ND	9.95	9.92	10.0	100	99	0.3	80-120	25
Chlorobenzene	ND	9.70	9.80	10.0	97	98	1.0	80-120	25

Surrogates	Sample %Recovery	%Recovery MS	%Recovery MSD	Acceptance Limit Recovery
1,2-Dichloroethane-d4	86	102	104	80-120
Bromofluorobenzene	98	102	101	80-120
Toluene-d8	96	98	101	80-120

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Metals

Quanterra
Environmental
Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW015-038
LAB ID: 130200-0001-SA
Matrix: AQUEOUS
Authorized: 13 JAN 98

Sampled: 13 JAN 98
Prepared: See Below

Received: 13 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	19 JAN 98	21 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	19 JAN 98	21 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	19 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW010-038
LAB ID: 130200-0002-SA
Matrix: AQUEOUS
Authorized: 13 JAN 98

Sampled: 13 JAN 98
Prepared: See Below

Received: 13 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	19 JAN 98	21 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	19 JAN 98	21 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	19 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental
Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW03-038
LAB ID: 130200-0003-SA
Matrix: AQUEOUS
Authorized: 13 JAN 98

Sampled: 13 JAN 98
Prepared: See Below

Received: 13 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	19 JAN 98	21 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	19 JAN 98	21 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	19 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130200-0001-SA	AQUEOUS	QICP-A		19 JAN 98-OX	19 JAN 98-OA
130200-0002-SA	AQUEOUS	QICP-A		19 JAN 98-OX	19 JAN 98-OA
130200-0003-SA	AQUEOUS	QICP-A		19 JAN 98-OX	19 JAN 98-OA

Quanterra
Environmental
Services

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 130200

Test: Q-ICP-AR Method 6010A - ICP Metals
Matrix: AQUEOUS
QC Run: 19 JAN 98-OX Date Analyzed: 21 JAN 98

Analyte	Result	Units	Reporting Limit
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Copper	ND	mg/L	0.020

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 130200

Category: QICP-A Method 6010A - ICP Metals
Matrix: AQUEOUS Date Analyzed: 21 JAN 98
QC Run: 19 JAN 98-OX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Cadmium	0.0500	0.0517	103	80-115
Chromium	0.200	0.218	109	80-115
Copper	0.250	0.281	112	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental
Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 130200

Category: QICP-A Method 6010A - ICP Metals
Matrix: AQUEOUS
Sample: 130202-0006
MS Run: 19 JAN 98-OA
Units: mg/L

Analyte	Concentration Sample Result	MS Result	MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Cadmium	ND	0.0497	0.0530	0.0500	99	106	6.3	80-115	20
Chromium	0.0113	0.230	0.233	0.200	110	111	1.1	80-115	20
Copper	ND	0.287	0.288	0.250	115	115	0.3	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

General Chemistry

Quanterra
Environmental
Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW015-038
LAB ID: 130200-0001-SA
Matrix: AQUEOUS Sampled: 13 JAN 98 Received: 13 JAN 98
Authorized: 13 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	6.7		1.0	NA	units	SW9040	NA	13 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW010-038
LAB ID: 130200-0002-SA
Matrix: AQUEOUS
Authorized: 13 JAN 98
Sampled: 13 JAN 98
Prepared: See Below
Received: 13 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	7.4		1.0	NA	units	SW9040	NA	13 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW03-038
LAB ID: 130200-0003-SA
Matrix: AQUEOUS
Authorized: 13 JAN 98

Sampled: 13 JAN 98
Prepared: See Below

Received: 13 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	7.2		1.0	NA	units	SW9040	NA	13 JAN 98

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130200-0001-SA	AQUEOUS	QCR6-A		14 JAN 98-AX	14 JAN 98-AA
130200-0002-SA	AQUEOUS	QCR6-A		14 JAN 98-AX	14 JAN 98-AA
130200-0003-SA	AQUEOUS	QCR6-A		14 JAN 98-AX	14 JAN 98-AA

Quanterra
Environmental
Services

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation
Project: 130200

Test: Q-CR6-A Method SW7196 - Chromium, Hexavalent
Matrix: AQUEOUS
QC Run: 14 JAN 98-AX Date Analyzed: 14 JAN 98

Analyte	Result	Units	Reporting Limit
Chromium, Hexavalent	ND	mg/L	0.020

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation
Project: 130200

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS Date Analyzed: 14 JAN 98
QC Run: 14 JAN 98-AX
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
Chromium, Hexavalent	0.0500	0.0495	99	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Wet Chemistry Analysis and Preparation
Project: 130200

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS
Sample: 130200-0003
MS Run: 14 JAN 98-AA
Units: mg/L

Analyte	Concentration Sample Result	MS Result	MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Chromium, Hexavalent	ND	0.0495	0.0484	0.0500	99	97	2.2	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
GC/MS Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130200-0001-SA	AQUEOUS	PH-A	13 JAN 98-B		13 JAN 98-BA
130200-0002-SA	AQUEOUS	PH-A	13 JAN 98-B		13 JAN 98-BA
130200-0003-SA	AQUEOUS	PH-A	13 JAN 98-B		13 JAN 98-BA

Quanterra
Environmental
Services

DUPLICATE CONTROL SAMPLE REPORT
GC/MS Preparation
Project: 130200

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
QC Lot: 13 JAN 98-B Date Analyzed: 13 JAN 98
Concentration Units: units

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	%Recovery DCS1	%Recovery DCS2	RPD	Acceptance Limits Recov.	Acceptance Limits RPD
pH	9.18	9.12	9.12	99	99	0.0	98-102	1

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX DUPLICATE QC REPORT
GC/MS Preparation
Project: 130200

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
Sample: 130200-0001
MS Run: 13 JAN 98-BA
Units: units

Analyte	Concentration Sample	Duplicate	%RPD SA-DU	Acceptance Limit
pH	6.70	6.70	0.0	30

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra Incorporated
1721 South Grand Avenue
Santa Ana, California 92705

714 258-8610 Telephone
714 258-0921 Fax

Quanterra
Environmental Services

February 6, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: 130227
PO/CONTRACT: 01992; 1Q97

Sharon Wallin
Phibro-Tech, Inc.
18881 Von Karman, Suite 650
Irvine, CA 92612

Dear Ms. Wallin,

This report contains the analytical results for the nine samples received under chain of custody by Quanterra Incorporated on January 14, 1998. These samples are associated with your Phibro-Tech., Inc. project.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Diane Suzuki
Project Manager

TABLE OF CONTENTS

QUANTERRA INCORPORATED PROJECT NUMBER 130227

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 130227

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met project and/or method-specified acceptance criteria. Any matrix-related anomalies are indicated using footnotes within the report. Any other anomalies are reported within the narrative.

There were no anomalies associated with this project.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

Quanterra
Environmental Services

SAMPLE DESCRIPTION INFORMATION
for
Phibro-Tech, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
130227-0001-SA	PTI-MW11-038	AQUEOUS	14 JAN 98	10:18	14 JAN 98
130227-0002-SA	PTI-MW06B-038	AQUEOUS	14 JAN 98	11:20	14 JAN 98
130227-0003-SA	PTI-MW06D-038	AQUEOUS	14 JAN 98	12:15	14 JAN 98
130227-0004-SA	PTI-MW07-038	AQUEOUS	14 JAN 98	13:45	14 JAN 98
130227-0005-SA	PTI-MW04A-038	AQUEOUS	14 JAN 98	14:55	14 JAN 98
130227-0006-SA	PTI-MW04-038	AQUEOUS	14 JAN 98	16:05	14 JAN 98
130227-0007-SA	PTI-MW35-038	AQUEOUS	14 JAN 98	09:20	14 JAN 98
130227-0008-EB	PTI-EB01-038	AQUEOUS	14 JAN 98	14:40	14 JAN 98
130227-0009-TB	PTI-TB02-038	AQUEOUS	14 JAN 98		14 JAN 98

VOC's

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW11-038		
LAB ID:	130227-0001-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 22 JAN 98	Analyzed: 22 JAN 98
Instrument:	GC/MS-MC	Dilution: 25	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		12	ug/L
Bromodichloromethane	ND		25	ug/L
Bromoform	ND		25	ug/L
Bromomethane	ND		25	ug/L
Carbon tetrachloride	ND		25	ug/L
Chlorobenzene	ND		25	ug/L
Chloroethane	ND		25	ug/L
Chloroform	ND		25	ug/L
Chloromethane	ND		25	ug/L
Dibromochloromethane	ND		25	ug/L
1,2-Dichlorobenzene	ND		25	ug/L
1,3-Dichlorobenzene	ND		25	ug/L
1,4-Dichlorobenzene	ND		25	ug/L
1,1-Dichloroethane	56		25	ug/L
1,2-Dichloroethane	ND		25	ug/L
1,1-Dichloroethene	28		25	ug/L
trans-1,2-Dichloroethene	ND		25	ug/L
1,2-Dichloropropane	ND		25	ug/L
cis-1,3-Dichloropropene	ND		25	ug/L
trans-1,3-Dichloropropene	ND		25	ug/L
Ethylbenzene	1800		25	ug/L
Methylene chloride	ND		25	ug/L
1,1,2,2-Tetrachloroethane	ND		25	ug/L
Tetrachloroethene	ND		25	ug/L
Toluene	770		25	ug/L
1,1,1-Trichloroethane	ND		25	ug/L
1,1,2-Trichloroethane	ND		25	ug/L
Trichloroethene	390		25	ug/L
Trichlorofluoromethane	ND		25	ug/L
Vinyl chloride	ND		25	ug/L
Xylenes (total)	2200		25	ug/L
2-Chloroethyl vinyl ether	ND		25	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	85	%	80 - 120
Toluene-d8	101	%	80 - 120
Bromofluorobenzene	109	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW06B-038		
LAB ID:	130227-0002-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 24 JAN 98	Analyzed: 24 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	1.7		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	32		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.1		1.0	ug/L
Toluene	15		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	17		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	39		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	100	%	80 - 120
Toluene-d8	100	%	80 - 120
Bromofluorobenzene	99	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW06D-038		
LAB ID:	130227-0003-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 22 JAN 98	Analyzed: 22 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	12		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.5		1.0	ug/L
Toluene	3.9		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	8.7		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	15		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	89	%	80 - 120
Toluene-d8	105	%	80 - 120
Bromofluorobenzene	111	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW07-038		
LAB ID:	130227-0004-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 23 JAN 98	Analyzed: 23 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	1.6		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	38		1.0	ug/L
1,2-Dichloroethane	24		1.0	ug/L
1,1-Dichloroethene	10		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	5.2		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	2.2		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	97		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	6.8		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	99	%	80 - 120
Toluene-d8	109	%	80 - 120
Bromofluorobenzene	113	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW04A-038		
LAB ID:	130227-0005-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 23 JAN 98	Analyzed: 23 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	11		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	2.9		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	1.8		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.8		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	14		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	1.9		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	91	%	80 - 120
Toluene-d8	101	%	80 - 120
Bromofluorobenzene	110	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW04-038		
LAB ID:	130227-0006-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 24 JAN 98	Analyzed: 24 JAN 98
Instrument:	GC/MS-MC	Dilution: 10	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		5.0	ug/L
Bromodichloromethane	ND		10	ug/L
Bromoform	ND		10	ug/L
Bromomethane	ND		10	ug/L
Carbon tetrachloride	ND		10	ug/L
Chlorobenzene	ND		10	ug/L
Chloroethane	ND		10	ug/L
Chloroform	ND		10	ug/L
Chloromethane	ND		10	ug/L
Dibromochloromethane	ND		10	ug/L
1,2-Dichlorobenzene	ND		10	ug/L
1,3-Dichlorobenzene	ND		10	ug/L
1,4-Dichlorobenzene	ND		10	ug/L
1,1-Dichloroethane	72		10	ug/L
1,2-Dichloroethane	61		10	ug/L
1,1-Dichloroethene	42		10	ug/L
trans-1,2-Dichloroethene	ND		10	ug/L
1,2-Dichloropropane	ND		10	ug/L
cis-1,3-Dichloropropene	ND		10	ug/L
trans-1,3-Dichloropropene	ND		10	ug/L
Ethylbenzene	530		10	ug/L
Methylene chloride	46		10	ug/L
1,1,2,2-Tetrachloroethane	ND		10	ug/L
Tetrachloroethene	ND		10	ug/L
Toluene	ND		10	ug/L
1,1,1-Trichloroethane	ND		10	ug/L
1,1,2-Trichloroethane	ND		10	ug/L
Trichloroethene	180		10	ug/L
Trichlorofluoromethane	ND		10	ug/L
Vinyl chloride	ND		10	ug/L
Xylenes (total)	420		10	ug/L
2-Chloroethyl vinyl ether	ND		10	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	94	%	80 - 120
Toluene-d8	95	%	80 - 120
Bromofluorobenzene	91	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW35-038		
LAB ID:	130227-0007-SA		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 24 JAN 98	Analyzed: 24 JAN 98
Instrument:	GC/MS-MC	Dilution: 5.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		2.5	ug/L
Bromodichloromethane	ND		5.0	ug/L
Bromoform	ND		5.0	ug/L
Bromomethane	ND		5.0	ug/L
Carbon tetrachloride	ND		5.0	ug/L
Chlorobenzene	ND		5.0	ug/L
Chloroethane	ND		5.0	ug/L
Chloroform	9.2		5.0	ug/L
Chloromethane	ND		5.0	ug/L
Dibromochloromethane	ND		5.0	ug/L
1,2-Dichlorobenzene	ND		5.0	ug/L
1,3-Dichlorobenzene	ND		5.0	ug/L
1,4-Dichlorobenzene	ND		5.0	ug/L
1,1-Dichloroethane	67		5.0	ug/L
1,2-Dichloroethane	58		5.0	ug/L
1,1-Dichloroethene	43		5.0	ug/L
trans-1,2-Dichloroethene	ND		5.0	ug/L
1,2-Dichloropropane	ND		5.0	ug/L
cis-1,3-Dichloropropene	ND		5.0	ug/L
trans-1,3-Dichloropropene	ND		5.0	ug/L
Ethylbenzene	480		5.0	ug/L
Methylene chloride	44		5.0	ug/L
1,1,2,2-Tetrachloroethane	ND		5.0	ug/L
Tetrachloroethene	ND		5.0	ug/L
Toluene	ND		5.0	ug/L
1,1,1-Trichloroethane	ND		5.0	ug/L
1,1,2-Trichloroethane	ND		5.0	ug/L
Trichloroethene	170		5.0	ug/L
Trichlorofluoromethane	ND		5.0	ug/L
Vinyl chloride	ND		5.0	ug/L
Xylenes (total)	390		5.0	ug/L
2-Chloroethyl vinyl ether	ND		5.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	101	%	80 - 120
Toluene-d8	98	%	80 - 120
Bromofluorobenzene	96	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-EB01-038		
LAB ID:	130227-0008-EB		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 22 JAN 98	Analyzed: 22 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	81	%	80 - 120
Toluene-d8	102	%	80 - 120
Bromofluorobenzene	106	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-TB02-038		
LAB ID:	130227-0009-TB		
Matrix:	AQUEOUS	Sampled: 14 JAN 98	Received: 14 JAN 98
Authorized:	14 JAN 98	Prepared: 24 JAN 98	Analyzed: 24 JAN 98
Instrument:	GC/MS-MC	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	96	%	80 - 120
Toluene-d8	99	%	80 - 120
Bromofluorobenzene	92	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130227-0001-SA	AQUEOUS	Q8260-A		22 JAN 98-BCX	23 JAN 98-BC
130227-0002-SA	AQUEOUS	Q8260-A		23 JAN 98-BCX	23 JAN 98-BC
130227-0003-SA	AQUEOUS	Q8260-A		22 JAN 98-BCX	23 JAN 98-BC
130227-0004-SA	AQUEOUS	Q8260-A		22 JAN 98-BCX	23 JAN 98-BC
130227-0005-SA	AQUEOUS	Q8260-A		22 JAN 98-BCX	23 JAN 98-BC
130227-0006-SA	AQUEOUS	Q8260-A		24 JAN 98-ACX	23 JAN 98-BC
130227-0007-SA	AQUEOUS	Q8260-A		23 JAN 98-BCX	23 JAN 98-BC
130227-0008-EB	AQUEOUS	Q8260-A		22 JAN 98-BCX	23 JAN 98-BC
130227-0009-TB	AQUEOUS	Q8260-A		23 JAN 98-BCX	23 JAN 98-BC

Quanterra
Environmental Services

METHOD BLANK REPORT
Volatile Organics by GC/MS
Project: 130227

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL
Matrix: AQUEOUS
QC Run: 22 JAN 98-BCX Date Analyzed: 22 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	86	80 -120
Toluene-d8	110	80 -120
Bromofluorobenzene	115	80 -120

ND = Not Detected

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 130227

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 23 JAN 98-BCX Date Analyzed: 23 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	97	80 -120
Toluene-d8	99	80 -120
Bromofluorobenzene	92	80 -120

ND = Not Detected

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 130227

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 24 JAN 98-ACX Date Analyzed: 24 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	106	80 -120
Toluene-d8	101	80 -120
Bromofluorobenzene	100	80 -120

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS
Project: 130227

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 24 JAN 98
QC Run: 24 JAN 98-ACX
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,1-Dichloroethene	10.0	11.4	114	70-120
Trichloroethene	10.0	10.2	102	80-120
Benzene	10.0	9.85	98	80-120
Toluene	10.0	9.74	97	80-120
Chlorobenzene	10.0	9.78	98	80-120
Surrogates	**Concentration Spiked**	**Measured**	**Accuracy(%) LCS**	**Limits**
1,2-Dichloroethane-d4	10.0	11.0	110	80-120
Bromofluorobenzene	10.0	10.6	106	80-120
Toluene-d8	10.0	10.2	102	80-120

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 24 JAN 98
QC Run: 23 JAN 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,1-Dichloroethene	10.0	10.2	102	70-120
Trichloroethene	10.0	9.85	98	80-120
Benzene	10.0	9.82	98	80-120
Toluene	10.0	10.1	101	80-120
Chlorobenzene	10.0	9.48	95	80-120
Surrogates	**Concentration Spiked**	**Measured**	**Accuracy(%) LCS**	**Limits**
1,2-Dichloroethane-d4	10.0	9.99	100	80-120
Bromofluorobenzene	10.0	9.56	96	80-120
Toluene-d8	10.0	9.88	99	80-120

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 22 JAN 98
QC Run: 22 JAN 98-BCX
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,1-Dichloroethene	10.0	10.6	106	70-120
Trichloroethene	10.0	10.6	106	80-120
Benzene	10.0	9.20	92	80-120
Toluene	10.0	11.3	113	80-120
Chlorobenzene	10.0	11.5	115	80-120

Calculations are performed before rounding to avoid round-off errors in calculated results.

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS (cont.)
Project: 130227

Surrogates	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,2-Dichloroethane-d4	10.0	8.04	80	80-120
Bromofluorobenzene	10.0	11.4	114	80-120
Toluene-d8	10.0	10.5	105	80-120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Volatile Organics by GC/MS
Project: 130227

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS
Sample: 130200-0002
MS Run: 23 JAN 98-BC
Units: ug/L

Analyte	Concentration Sample Result	MS Result	MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
1,1-Dichloroethene	ND	11.2	11.5	10.0	112	115	2.7	70-120	25
Trichloroethene	2.98	13.1	13.4	10.0	101	104	2.2	80-120	25
Benzene	ND	9.72	9.95	10.0	97	100	2.3	80-120	25
Toluene	ND	9.95	9.92	10.0	100	99	0.3	80-120	25
Chlorobenzene	ND	9.70	9.80	10.0	97	98	1.0	80-120	25

Surrogates	Sample %Recovery	%Recovery MS	%Recovery MSD	Acceptance Limit Recovery
1,2-Dichloroethane-d4	86	102	104	80-120
Bromofluorobenzene	98	102	101	80-120
Toluene-d8	96	98	101	80-120

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Metals

Quanterra
Environmental
Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW11-038
LAB ID: 130227-0001-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	21 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	21 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06B-038
LAB ID: 130227-0002-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	21 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	21 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06D-038
LAB ID: 130227-0003-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	21 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	21 JAN 98
Copper	0.024		1.0	0.020	mg/L	6010A	20 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW07-038
LAB ID: 130227-0004-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	21 JAN 98
Chromium	0.010		1.0	0.010	mg/L	6010A	20 JAN 98	21 JAN 98
Copper	0.044		1.0	0.020	mg/L	6010A	20 JAN 98	21 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04A-038
LAB ID: 130227-0005-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	0.020		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04-038
LAB ID: 130227-0006-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	0.53		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	44.0		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW35-038
LAB ID: 130227-0007-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	0.50		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	42.8		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB01-038
LAB ID: 130227-0008-EB
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130227-0001-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0002-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0003-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0004-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0005-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0006-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0007-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130227-0008-EB	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA

Quanterra
Environmental Services

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 130227

Test: Q-ICP-AR Method 6010A - ICP Metals
Matrix: AQUEOUS
QC Run: 20 JAN 98-PX Date Analyzed: 21 JAN 98

Analyte	Result	Units	Reporting Limit
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Copper	ND	mg/L	0.020

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 130227

Category: QICP-A Method 6010A - ICP Metals
Matrix: AQUEOUS Date Analyzed: 21 JAN 98
QC Run: 20 JAN 98-PX
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
Cadmium	0.0500	0.0511	102	80-115
Chromium	0.200	0.221	110	80-115
Copper	0.250	0.284	114	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 130227

Category: QICP-A Method 6010A - ICP Metals
Matrix: AQUEOUS
Sample: 130227-0001
MS Run: 20 JAN 98-PA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Cadmium	ND	0.0460	0.0504	0.0500	92	101	9.1	80-115	20
Chromium	ND	0.212	0.211	0.200	106	105	0.3	80-115	20
Copper	ND	0.285	0.288	0.250	114	115	0.9	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

General Chemistry

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW11-038
LAB ID: 130227-0001-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	7.1		1.0	NA	units	SW9040	NA	14 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06B-038
LAB ID: 130227-0002-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	7.3		1.0	NA	units	SW9040	NA	14 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW06D-038
LAB ID: 130227-0003-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	7.4		1.0	NA	units	SW9040	NA	14 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW07-038
LAB ID: 130227-0004-SA
Matrix: AQUEOUS Sampled: 14 JAN 98 Received: 14 JAN 98
Authorized: 14 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	6.7		1.0	NA	units	SW9040	NA	14 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04A-038
LAB ID: 130227-0005-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	7.7		1.0	NA	units	SW9040	NA	14 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW04-038
LAB ID: 130227-0006-SA
Matrix: AQUEOUS Sampled: 14 JAN 98 Received: 14 JAN 98
Authorized: 14 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	39.2		1000	20.0	mg/L	SW7196	NA	14 JAN 98
pH	6.9		1.0	NA	units	SW9040	NA	14 JAN 98

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW35-038
LAB ID: 130227-0007-SA
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	43.6		1000	20.0	mg/L	SW7196	NA	14 JAN 98
pH	6.9		1.0	NA	units	SW9040	NA	14 JAN 98

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB01-038
LAB ID: 130227-0008-EB
Matrix: AQUEOUS
Authorized: 14 JAN 98

Sampled: 14 JAN 98
Prepared: See Below

Received: 14 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	14 JAN 98
pH	5.8		1.0	NA	units	SW9040	NA	14 JAN 98

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130227-0001-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0002-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0003-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0004-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0005-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0006-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0007-SA	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA
130227-0008-EB	AQUEOUS	QCR6-A		14 JAN 98-BX	14 JAN 98-BA

Quanterra
Environmental Services

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation
Project: 130227

Test: Q-CR6-A Method SW7196 - Chromium, Hexavalent
Matrix: AQUEOUS
QC Run: 14 JAN 98-BX Date Analyzed: 14 JAN 98

Analyte	Result	Units	Reporting Limit
Chromium, Hexavalent	ND	mg/L	0.020

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation
Project: 130227

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS Date Analyzed: 14 JAN 98
QC Run: 14 JAN 98-BX
Concentration Units: mg/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
Chromium, Hexavalent	0.0500	0.0490	98	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Wet Chemistry Analysis and Preparation
Project: 130227

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS
Sample: 130227-0001
MS Run: 14 JAN 98-BA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Chromium, Hexavalent	ND	0.0490	0.0511	0.0500	98	102	4.2	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
GC/MS Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130227-0001-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0002-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0003-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0004-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0005-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0006-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0007-SA	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB
130227-0008-EB	AQUEOUS	PH-A	14 JAN 98-B		14 JAN 98-BB

Quanterra
Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
GC/MS Preparation
Project: 130227

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
QC Lot: 14 JAN 98-B Date Analyzed: 14 JAN 98
Concentration Units: units

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	%Recovery DCS1	%Recovery DCS2	RPD	Acceptance Limits Recov.	Acceptance Limits RPD
pH	9.18	9.11	9.11	99	99	0.0	98-102	1

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

February 3, 1998

QUANTERRA INCORPORATED PROJECT NUMBER: 130254
PO/CONTRACT: 01992; 1Q97

Sharon Wallin
Phibro-Tech, Inc.
18881 Von Karman, Suite 650
Irvine, CA 92612

Dear Ms. Wallin,

This report contains the analytical results for the eight samples received under chain of custody by Quanterra Incorporated on January 15, 1998. These samples are associated with your Phibro-Tech., Inc. project.

The case narrative is an integral part of this report.

If you have any questions, please feel free to call me at (714) 258-8610.

Sincerely,

Diane Suzuki
Project Manager

TABLE OF CONTENTS

QUANTERRA INCORPORATED PROJECT NUMBER 130254

CASE NARRATIVE

QUANTERRA INCORPORATED PROJECT NUMBER 130254

All applicable internal quality control analyses including calibrations and calibration verifications, calibration (instrument) and method blanks, laboratory control samples (LCS), matrix spikes (MS) and matrix spike duplicates (MSD), and other QC met project and/or method-specified acceptance criteria. Any matrix-related anomalies are indicated using footnotes within the report. Any other anomalies are reported within the narrative.

There were no anomalies associated with this project.

Quanterra Environmental Services - Western Region

Quality Control Definitions

QC Parameter	Definition
QC Batch	A set of up to 20 field samples plus associated laboratory QC samples that are similar in composition (matrix) and that are processed within the same time period with the same reagent and standard lots.
Duplicate Control Sample (DCS)	Consist of a pair of LCSs analyzed within the same QC batch to monitor precision and accuracy independent of sample matrix effects. This QC is performed only if required by client or when insufficient sample is available to perform MS/MSD.
Duplicate Sample (DU)	A second aliquot of an environmental sample, taken from the same sample container when possible, that is processed independently with the first sample aliquot. The results are used to assess the effect of the sample matrix on the precision of the analytical process. The precision estimated using this sample is not necessarily representative of the precision for other samples in the batch.
Laboratory Control Sample (LCS)	A volume of reagent water for aqueous samples or a contaminant-free solid matrix (Ottawa sand) for soil and sediment samples which is spiked with known amounts of representative target analytes and required surrogates. An LCS is carried through the entire analytical process and is used to monitor the accuracy of the analytical process independent of potential matrix effects.
Matrix Spike and Matrix Spike Duplicate (MS/MSD)	A field sample fortified with known quantities of target analytes that are also added to the LCS. Matrix spike duplicate is a second matrix spike sample. MSs/MSDs are carried through the entire analytical process and are used to determine sample matrix effect on accuracy of the measurement system. The accuracy and precision estimated using MS/MSD is only representative of the precision of the sample that was spiked.
Method Blank (MB)	A sample composed of all the reagents (in the same quantities) in reagent water carried through the entire analytical process. The method blank is used to monitor the level of contamination introduced during sample preparation steps.
Surrogate Spike	Organic constituents not expected to be detected in environmental media and are added to every sample and QC at a known concentration. Surrogates are used to determine the efficiency of the sample preparation and the analytical process.

Source: Quanterra® Quality Control Program, Policy QA-003, Rev. 0, 8/19/96.

Quanterra
Environmental Services

SAMPLE DESCRIPTION INFORMATION
for
Phibro-Tech, Inc.

Lab ID	Client ID	Matrix	Sampled Date	Sampled Time	Received Date
130254-0001-SA	PTI-MW14S-038	AQUEOUS	15 JAN 98	09:15	15 JAN 98
130254-0002-SA	PTI-MW15S-038	AQUEOUS	15 JAN 98	10:00	15 JAN 98
130254-0003-SA	PTI-MW15D-038	AQUEOUS	15 JAN 98	10:55	15 JAN 98
130254-0004-SA	PTI-MW16-038	AQUEOUS	15 JAN 98	14:35	15 JAN 98
130254-0005-SA	PTI-MW09-038	AQUEOUS	15 JAN 98	16:10	15 JAN 98
130254-0006-SA	PTI-MW37-038	AQUEOUS	15 JAN 98	07:30	15 JAN 98
130254-0007-SA	PTI-EB02-038	AQUEOUS	15 JAN 98	14:55	15 JAN 98
130254-0008-TB	PTI-TB02-038	AQUEOUS	15 JAN 98	14:55	15 JAN 98

VOC's

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW14S-038		
LAB ID:	130254-0001-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 27 JAN 98	Analyzed: 27 JAN 98
Instrument:	GC/MS-MD	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	21		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	11		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	13		1.0	ug/L
1,2-Dichloroethane	4.7		1.0	ug/L
1,1-Dichloroethene	11		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	19		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.2		1.0	ug/L
Toluene	1.1		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	50		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	5.0		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	109	%	80 - 120
Toluene-d8	99	%	80 - 120
Bromofluorobenzene	98	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW15S-038		
LAB ID:	130254-0002-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 28 JAN 98	Analyzed: 28 JAN 98
Instrument:	GC/MS-MH	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	4.2		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	2.9		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	12		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.4		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	5.0		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	3.7		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	105	%	80 - 120
Toluene-d8	106	%	80 - 120
Bromofluorobenzene	107	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW15D-038		
LAB ID:	130254-0003-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 27 JAN 98	Analyzed: 27 JAN 98
Instrument:	GC/MS-MD	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	7.6		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.4		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	3.9		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	2.3		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	108	%	80 - 120
Toluene-d8	99	%	80 - 120
Bromofluorobenzene	98	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW16-038		
LAB ID:	130254-0004-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 28 JAN 98	Analyzed: 28 JAN 98
Instrument:	GC/MS-MH	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	92		1.0	ug/L
1,2-Dichloroethane	57		1.0	ug/L
1,1-Dichloroethene	13		1.0	ug/L
trans-1,2-Dichloroethene	2.4		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	12		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	1.8		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	29		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	3.8		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	118	%	80 - 120
Toluene-d8	108	%	80 - 120
Bromofluorobenzene	111	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW09-038		
LAB ID:	130254-0005-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 27 JAN 98	Analyzed: 27 JAN 98
Instrument:	GC/MS-MD	Dilution: 10	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		5.0	ug/L
Bromodichloromethane	ND		10	ug/L
Bromoform	ND		10	ug/L
Bromomethane	ND		10	ug/L
Carbon tetrachloride	ND		10	ug/L
Chlorobenzene	ND		10	ug/L
Chloroethane	ND		10	ug/L
Chloroform	99		10	ug/L
Chloromethane	ND		10	ug/L
Dibromochloromethane	ND		10	ug/L
1,2-Dichlorobenzene	ND		10	ug/L
1,3-Dichlorobenzene	ND		10	ug/L
1,4-Dichlorobenzene	ND		10	ug/L
1,1-Dichloroethane	240		10	ug/L
1,2-Dichloroethane	200		10	ug/L
1,1-Dichloroethene	67		10	ug/L
trans-1,2-Dichloroethene	ND		10	ug/L
1,2-Dichloropropane	ND		10	ug/L
cis-1,3-Dichloropropene	ND		10	ug/L
trans-1,3-Dichloropropene	ND		10	ug/L
Ethylbenzene	690		10	ug/L
Methylene chloride	20		10	ug/L
1,1,2,2-Tetrachloroethane	ND		10	ug/L
Tetrachloroethene	ND		10	ug/L
Toluene	ND		10	ug/L
1,1,1-Trichloroethane	37		10	ug/L
1,1,2-Trichloroethane	ND		10	ug/L
Trichloroethene	270		10	ug/L
Trichlorofluoromethane	ND		10	ug/L
Vinyl chloride	ND		10	ug/L
Xylenes (total)	260		10	ug/L
2-Chloroethyl vinyl ether	ND		10	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	115	%	80 - 120
Toluene-d8	99	%	80 - 120
Bromofluorobenzene	102	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-MW37-038		
LAB ID:	130254-0006-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 27 JAN 98	Analyzed: 27 JAN 98
Instrument:	GC/MS-MD	Dilution: 10	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		5.0	ug/L
Bromodichloromethane	ND		10	ug/L
Bromoform	ND		10	ug/L
Bromomethane	ND		10	ug/L
Carbon tetrachloride	ND		10	ug/L
Chlorobenzene	ND		10	ug/L
Chloroethane	ND		10	ug/L
Chloroform	95		10	ug/L
Chloromethane	ND		10	ug/L
Dibromochloromethane	ND		10	ug/L
1,2-Dichlorobenzene	ND		10	ug/L
1,3-Dichlorobenzene	ND		10	ug/L
1,4-Dichlorobenzene	ND		10	ug/L
1,1-Dichloroethane	230		10	ug/L
1,2-Dichloroethane	210		10	ug/L
1,1-Dichloroethene	65		10	ug/L
trans-1,2-Dichloroethene	ND		10	ug/L
1,2-Dichloropropane	ND		10	ug/L
cis-1,3-Dichloropropene	ND		10	ug/L
trans-1,3-Dichloropropene	ND		10	ug/L
Ethylbenzene	660		10	ug/L
Methylene chloride	20		10	ug/L
1,1,2,2-Tetrachloroethane	ND		10	ug/L
Tetrachloroethene	ND		10	ug/L
Toluene	ND		10	ug/L
1,1,1-Trichloroethane	34		10	ug/L
1,1,2-Trichloroethane	ND		10	ug/L
Trichloroethene	260		10	ug/L
Trichlorofluoromethane	ND		10	ug/L
Vinyl chloride	ND		10	ug/L
Xylenes (total)	260		10	ug/L
2-Chloroethyl vinyl ether	ND		10	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	116	%	80 - 120
Toluene-d8	96	%	80 - 120
Bromofluorobenzene	99	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-EB02-038		
LAB ID:	130254-0007-SA		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 27 JAN 98	Analyzed: 27 JAN 98
Instrument:	GC/MS-MD	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	105	%	80 - 120
Toluene-d8	95	%	80 - 120
Bromofluorobenzene	92	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

Volatile Organic Compounds
Method SW8260A

Client Name:	Phibro-Tech, Inc.		
Client ID:	PTI-TB02-038		
LAB ID:	130254-0008-TB		
Matrix:	AQUEOUS	Sampled: 15 JAN 98	Received: 15 JAN 98
Authorized:	15 JAN 98	Prepared: 28 JAN 98	Analyzed: 28 JAN 98
Instrument:	GC/MS-MH	Dilution: 1.0	

Parameter	Result	Qualifier	RL	Units
Benzene	ND		0.50	ug/L
Bromodichloromethane	ND		1.0	ug/L
Bromoform	ND		1.0	ug/L
Bromomethane	ND		1.0	ug/L
Carbon tetrachloride	ND		1.0	ug/L
Chlorobenzene	ND		1.0	ug/L
Chloroethane	ND		1.0	ug/L
Chloroform	ND		1.0	ug/L
Chloromethane	ND		1.0	ug/L
Dibromochloromethane	ND		1.0	ug/L
1,2-Dichlorobenzene	ND		1.0	ug/L
1,3-Dichlorobenzene	ND		1.0	ug/L
1,4-Dichlorobenzene	ND		1.0	ug/L
1,1-Dichloroethane	ND		1.0	ug/L
1,2-Dichloroethane	ND		1.0	ug/L
1,1-Dichloroethene	ND		1.0	ug/L
trans-1,2-Dichloroethene	ND		1.0	ug/L
1,2-Dichloropropane	ND		1.0	ug/L
cis-1,3-Dichloropropene	ND		1.0	ug/L
trans-1,3-Dichloropropene	ND		1.0	ug/L
Ethylbenzene	ND		1.0	ug/L
Methylene chloride	ND		1.0	ug/L
1,1,2,2-Tetrachloroethane	ND		1.0	ug/L
Tetrachloroethene	ND		1.0	ug/L
Toluene	ND		1.0	ug/L
1,1,1-Trichloroethane	ND		1.0	ug/L
1,1,2-Trichloroethane	ND		1.0	ug/L
Trichloroethene	ND		1.0	ug/L
Trichlorofluoromethane	ND		1.0	ug/L
Vinyl chloride	ND		1.0	ug/L
Xylenes (total)	ND		1.0	ug/L
2-Chloroethyl vinyl ether	ND		1.0	ug/L

Surrogate	Recovery		Acceptable Range
1,2-Dichloroethane-d4	91	%	80 - 120
Toluene-d8	104	%	80 - 120
Bromofluorobenzene	103	%	80 - 120

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Volatile Organics by GC/MS

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130254-0001-SA	AQUEOUS	Q8260-A		26 JAN 98-BDX	30 JAN 98-BH
130254-0002-SA	AQUEOUS	Q8260-A		28 JAN 98-BHX	30 JAN 98-BH
130254-0003-SA	AQUEOUS	Q8260-A		26 JAN 98-BDX	30 JAN 98-BH
130254-0004-SA	AQUEOUS	Q8260-A		28 JAN 98-BHX	30 JAN 98-BH
130254-0005-SA	AQUEOUS	Q8260-A		26 JAN 98-BDX	30 JAN 98-BH
130254-0006-SA	AQUEOUS	Q8260-A		26 JAN 98-BDX	30 JAN 98-BH
130254-0007-SA	AQUEOUS	Q8260-A		26 JAN 98-BDX	30 JAN 98-BH
130254-0008-TB	AQUEOUS	Q8260-A		28 JAN 98-BHX	30 JAN 98-BH

Quanterra
Environmental Services

METHOD BLANK REPORT
Volatile Organics by GC/MS
Project: 130254

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL
Matrix: AQUEOUS
QC Run: 26 JAN 98-BDX Date Analyzed: 26 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	99	80 -120
Toluene-d8	97	80 -120
Bromofluorobenzene	95	80 -120

ND = Not Detected

Quanterra
Environmental Services

METHOD BLANK REPORT (cont.)
Volatile Organics by GC/MS
Project: 130254

Test: Q8260-DW-AP Method SW8260A - Volatile Organics - 25 mL (cont.)
Matrix: AQUEOUS

QC Run: 28 JAN 98-BHX Date Analyzed: 28 JAN 98

Analyte	Result	Units	Reporting Limit
Benzene	ND	ug/L	0.50
Bromodichloromethane	ND	ug/L	1.0
Bromoform	ND	ug/L	1.0
Bromomethane	ND	ug/L	1.0
Carbon tetrachloride	ND	ug/L	1.0
Chlorobenzene	ND	ug/L	1.0
Chloroethane	ND	ug/L	1.0
Chloroform	ND	ug/L	1.0
Chloromethane	ND	ug/L	1.0
Dibromochloromethane	ND	ug/L	1.0
1,2-Dichlorobenzene	ND	ug/L	1.0
1,3-Dichlorobenzene	ND	ug/L	1.0
1,4-Dichlorobenzene	ND	ug/L	1.0
1,1-Dichloroethane	ND	ug/L	1.0
1,2-Dichloroethane	ND	ug/L	1.0
1,1-Dichloroethene	ND	ug/L	1.0
trans-1,2-Dichloroethene	ND	ug/L	1.0
1,2-Dichloropropane	ND	ug/L	1.0
cis-1,3-Dichloropropene	ND	ug/L	1.0
trans-1,3-Dichloropropene	ND	ug/L	1.0
Ethylbenzene	ND	ug/L	1.0
Methylene chloride	ND	ug/L	1.0
1,1,2,2-Tetrachloroethane	ND	ug/L	1.0
Tetrachloroethene	ND	ug/L	1.0
Toluene	ND	ug/L	1.0
1,1,1-Trichloroethane	ND	ug/L	1.0
1,1,2-Trichloroethane	ND	ug/L	1.0
Trichloroethene	ND	ug/L	1.0
Trichlorofluoromethane	ND	ug/L	1.0
Vinyl chloride	ND	ug/L	1.0
Xylenes (total)	ND	ug/L	1.0
2-Chloroethyl vinyl ether	ND	ug/L	1.0

Surrogate	Recovery	Acceptable Range
1,2-Dichloroethane-d4	94	80 -120
Toluene-d8	110	80 -120
Bromofluorobenzene	108	80 -120

ND = Not Detected

LABORATORY CONTROL SAMPLE REPORT
Volatile Organics by GC/MS
Project: 130254

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 28 JAN 98
QC Run: 28 JAN 98-BHX
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,1-Dichloroethene	10.0	10.9	109	70-120
Trichloroethene	10.0	9.86	99	80-120
Benzene	10.0	9.40	94	80-120
Toluene	10.0	9.84	98	80-120
Chlorobenzene	10.0	9.30	93	80-120

Surrogates	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,2-Dichloroethane-d4	10.0	9.24	92	80-120
Bromofluorobenzene	10.0	10.7	107	80-120
Toluene-d8	10.0	10.3	103	80-120

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS Date Analyzed: 26 JAN 98
QC Run: 26 JAN 98-BDX
Concentration Units: ug/L

Analyte	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,1-Dichloroethene	10.0	9.52	95	70-120
Trichloroethene	10.0	10.6	106	80-120
Benzene	10.0	9.48	95	80-120
Toluene	10.0	9.09	91	80-120
Chlorobenzene	10.0	9.39	94	80-120

Surrogates	Concentration Spiked	Measured	Accuracy(%) LCS	Limits
1,2-Dichloroethane-d4	10.0	10.1	101	80-120
Bromofluorobenzene	10.0	9.70	97	80-120
Toluene-d8	10.0	9.77	98	80-120

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Volatile Organics by GC/MS
Project: 130254

Category: Q8260-A Method SW8260A - Volatile Organics
Matrix: AQUEOUS
Sample: 130325-0001
MS Run: 30 JAN 98-BH
Units: ug/L

Analyte	Concentration Sample Result	MS Result	MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
1,1-Dichloroethene	ND	11.2	11.1	10.0	112	111	0.9	70-120	25
Trichloroethene	ND	9.57	9.62	10.0	96	96	0.5	80-120	25
Benzene	ND	9.27	9.24	10.0	93	92	0.3	80-120	25
Toluene	ND	10.1	9.65	10.0	101	96	4.2	80-120	25
Chlorobenzene	ND	9.29	9.43	10.0	93	94	1.5	80-120	25

Surrogates	Sample %Recovery	%Recovery MS	%Recovery MSD	Acceptance Limit Recovery
1,2-Dichloroethane-d4	96	109	105	80-120
Bromofluorobenzene	106	114	111	80-120
Toluene-d8	102	106	103	80-120

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Metals

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW14S-038
LAB ID: 130254-0001-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	0.018		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	0.020		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15S-038
LAB ID: 130254-0002-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	0.021		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15D-038
LAB ID: 130254-0003-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW16-038
LAB ID: 130254-0004-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW09-038
LAB ID: 130254-0005-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW37-038
LAB ID: 130254-0006-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

METALS
(Water)

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB02-038
LAB ID: 130254-0007-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Cadmium	ND		1.0	0.0050	mg/L	6010A	20 JAN 98	22 JAN 98
Chromium	ND		1.0	0.010	mg/L	6010A	20 JAN 98	22 JAN 98
Copper	ND		1.0	0.020	mg/L	6010A	20 JAN 98	22 JAN 98

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Metals Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130254-0001-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130254-0002-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130254-0003-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130254-0004-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130254-0005-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130254-0006-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA
130254-0007-SA	AQUEOUS	QICP-A		20 JAN 98-PX	20 JAN 98-PA

Quanterra
Environmental Services

METHOD BLANK REPORT
Metals Analysis and Preparation
Project: 130254

Test: Q-ICP-AR Method 6010A - ICP Metals
Matrix: AQUEOUS
QC Run: 20 JAN 98-PX Date Analyzed: 21 JAN 98

Analyte	Result	Units	Reporting Limit
Cadmium	ND	mg/L	0.0050
Chromium	ND	mg/L	0.010
Copper	ND	mg/L	0.020

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Metals Analysis and Preparation
Project: 130254

Category: QICP-A Method 6010A - ICP Metals
Matrix: AQUEOUS Date Analyzed: 21 JAN 98
QC Run: 20 JAN 98-PX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Cadmium	0.0500	0.0511	102	80-115
Chromium	0.200	0.221	110	80-115
Copper	0.250	0.284	114	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Metals Analysis and Preparation
Project: 130254

Category: QICP-A Method 6010A - ICP Metals
Matrix: AQUEOUS
Sample: 130227-0001
MS Run: 20 JAN 98-PA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Cadmium	ND	0.0460	0.0504	0.0500	92	101	9.1	80-115	20
Chromium	ND	0.212	0.211	0.200	106	105	0.3	80-115	20
Copper	ND	0.285	0.288	0.250	114	115	0.9	85-115	20

ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental
Services

General Chemistry

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW14S-038
LAB ID: 130254-0001-SA
Matrix: AQUEOUS Sampled: 15 JAN 98 Received: 15 JAN 98
Authorized: 15 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	7.3		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15S-038
LAB ID: 130254-0002-SA
Matrix: AQUEOUS Sampled: 15 JAN 98 Received: 15 JAN 98
Authorized: 15 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	7.4		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW15D-038
LAB ID: 130254-0003-SA
Matrix: AQUEOUS Sampled: 15 JAN 98 Received: 15 JAN 98
Authorized: 15 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	7.6		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW16-038
LAB ID: 130254-0004-SA
Matrix: AQUEOUS
Authorized: 15 JAN 98

Sampled: 15 JAN 98
Prepared: See Below

Received: 15 JAN 98
Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	7.0		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW09-038
LAB ID: 130254-0005-SA
Matrix: AQUEOUS Sampled: 15 JAN 98 Received: 15 JAN 98
Authorized: 15 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	6.9		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-MW37-038
LAB ID: 130254-0006-SA
Matrix: AQUEOUS Sampled: 15 JAN 98 Received: 15 JAN 98
Authorized: 15 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	6.9		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

GENERAL INORGANICS

Client Name: Phibro-Tech, Inc.
Client ID: PTI-EB02-038
LAB ID: 130254-0007-SA
Matrix: AQUEOUS Sampled: 15 JAN 98 Received: 15 JAN 98
Authorized: 15 JAN 98 Prepared: See Below Analyzed: See Below

Parameter	Result	Qual	DIL	RL	Units	Method	Prep Date	Analyzed Date
Chromium, Hexavalent	ND		1.0	0.020	mg/L	SW7196	NA	15 JAN 98
pH	6.5		1.0	NA	units	SW9040	NA	15 JAN 98

ND = Not Detected

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
Wet Chemistry Analysis and Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130254-0001-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA
130254-0002-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA
130254-0003-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA
130254-0004-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA
130254-0005-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA
130254-0006-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA
130254-0007-SA	AQUEOUS	QCR6-A		15 JAN 98-AX	15 JAN 98-AA

Quanterra
Environmental Services

METHOD BLANK REPORT
Wet Chemistry Analysis and Preparation
Project: 130254

Test: Q-CR6-A Method SW7196 - Chromium, Hexavalent
Matrix: AQUEOUS
QC Run: 15 JAN 98-AX Date Analyzed: 15 JAN 98

Analyte	Result	Units	Reporting Limit
Chromium, Hexavalent	ND	mg/L	0.020

ND = Not Detected

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE REPORT
Wet Chemistry Analysis and Preparation
Project: 130254

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS Date Analyzed: 15 JAN 98
QC Run: 15 JAN 98-AX
Concentration Units: mg/L

Analyte	Concentration Spiked	Concentration Measured	Accuracy(%) LCS	Accuracy(%) Limits
Chromium, Hexavalent	0.0500	0.0515	103	85-115

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX SPIKE/MATRIX SPIKE DUPLICATE QC REPORT
Wet Chemistry Analysis and Preparation
Project: 130254

Category: QCR6-A Method 7196 - Chromium, Hexavalent
Matrix: AQUEOUS
Sample: 130254-0001
MS Run: 15 JAN 98-AA
Units: mg/L

Analyte	Sample Result	Concentration MS Result	Concentration MSD Result	Amount Spiked MS/MSD	%Recovery MS	%Recovery MSD	%RPD	Acceptance Limit Recov.	Acceptance Limit RPD
Chromium, Hexavalent	ND	0.0604 n	0.0604 n	0.0500	121	121	0.0	85-115	20

n = Spiked analyte out of matrix spike acceptance limits; refer to lab control sample results.
ND = Not Detected

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

QC LOT ASSIGNMENT REPORT - MS QC
GC/MS Preparation

Laboratory Sample Number	QC Matrix	QC Category	QC Lot Number (DCS)	QC Run Number (SCS/BLANK/LCS)	MS QC Run Number (SA,MS,SD,DU)
130254-0001-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA
130254-0002-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA
130254-0003-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA
130254-0004-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA
130254-0005-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA
130254-0006-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA
130254-0007-SA	AQUEOUS	PH-A	15 JAN 98-B		15 JAN 98-BA

Quanterra
Environmental Services

DUPLICATE CONTROL SAMPLE REPORT
GC/MS Preparation
Project: 130254

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
QC Lot: 15 JAN 98-B Date Analyzed: 15 JAN 98
Concentration Units: units

Analyte	Concentration Spiked	Measured DCS1	Measured DCS2	%Recovery DCS1	%Recovery DCS2	RPD	Acceptance Limits Recov.	Acceptance Limits RPD
pH	9.18	9.12	9.12	99	99	0.0	98-102	1

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

MATRIX DUPLICATE QC REPORT
GC/MS Preparation
Project: 130254

Category: PH-A pH for Aqueous Samples
Matrix: AQUEOUS
Sample: 130254-0001
MS Run: 15 JAN 98-BA
Units: units

Analyte	Concentration Sample	Duplicate	%RPD SA-DU	Acceptance Limit
pH	7.30	7.30	0.0	30

Calculations are performed before rounding to avoid round-off errors in calculated results.

Appendix C
Completed COC Forms

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser & McKee	Sharon Wallin	1-15-98	62540
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page**
18881 Von Karman Ave	714-752-5452	130254	1 of 2
City / State / Zip Code	**Site Contact**	**Lab Contact**	
Irvine / CA / 92612	Ed Vigil	Maycarol V.	
Project Name	**Carrier/Waybill Number**		
Phibro-Tech, Inc			
Contract/Purchase Order/Quote No.			
2279-11463-110-FLD			

Analysis (Attach list if more space is needed)

4.0

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		8260	Cr, Cu, Cd	Cr tr, pH	Special Instructions/ Conditions of Receipt
PTI-MW14S-038	1-15-98	9:15	X							X				X			
PTI-MW14S-038		↓							X						X		Field filtered
PTI-MW14S-038		↓					X									X	24 hr HOLD
PTI-MW15S-038		10:00								X				X			
PTI-MW15S-038		↓							X						X		Field filtered
PTI-MW15S-038		↓					X									X	24 hr HOLD
PTI-MW15D-038		10:55							X	X				X			
PTI-MW15D-038		↓						X	X						X		Field filtered
PTI-MW15D-038		↓				X	X									X	24 hr HOLD
PTI-MW16-038		14:35								X				X			
PTI-MW16-038		↓							X						X		Field filtered
PTI-MW16-038		↓					X									X	24 hr HOLD

1-9

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other Normal

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	J Dybel	1-15-98	16:23	P Bautista	1-15-98	1623
2.	P Bautista	1-15-98	1905	[signature]	1/15/98	1905
3.						

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
CDM		1-15-98	62541
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** 2 of 2
		130254	
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Project Name	**Carrier/Waybill Number**		
Phibro-Tech			
Contract/Purchase Order/Quote No.			
2279-11463-110-FLD			

4.0°

Special Instructions/ Conditions of Receipt

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H_2SO_4	HNO_3	HCl	NaOH	ZnAc/NaOH	Analysis: 8240	Cr, Cd, Cu	Cr+6, pH	Special Instructions
PTI-MW09-038	1-15-98	1610	X						X			X			
PTI-MW09-038		↓						X					X		Field filtered
PTI-MW09-038		↓				X								X	24 hr HOLD
PTI-MW37-038		0730							X			X			
PTI-MW37-038		↓						X					X		Field filtered
PTI-MW37-038		↓				X								X	24 hr HOLD
PTI-EB02-038		1455							X			X			
PTI-EB02-038		↓						X					X		Field filtered
PTI-EB02-038		↓				X								X	24 hr HOLD
PTI-TB03-038		—							X			X			
								X					X		Field filtered
						X								X	24 hr HOLD

1-9

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other Normal

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
L Dybel	1-15-98	16:23	P Bautista	1-15-98	1623
2. Relinquished By	Date	Time	2. Received By	Date	Time
P Bautista	1-15-98	1905		1/15/98	1905
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser + McKee	Sharon Wallin	1-14-98	62536
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page**
5888 I Von Karman	714-752-5452	130227	1 of 3

City	State	Zip Code	Site Contact	Lab Contact
Irvine	CA	92618	Ed Vigil	Marycarol V.

Project Name: Phibro-Tech, Inc.

Carrier/Waybill Number:

Contract/Purchase Order/Quote No.: 2279-11463-110-FLD

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cr, Cu, Cd	pH, Cr+6	Special Instructions/ Conditions of Receipt
PTI-MW11-038	1-14-98	10:18	X						X			X			
PTI-MW11-038		↓	X					X					X		Field Filtered
PTI-MW11-038		↓	X			X								X	24 hr. HOLD time
PTI-MW06B-038		11:20	X						X			X			
PTI-MW06B-038		↓	X					X					X		Field Filtered
PTI-MW06B-038		↓	X			X								X	24 hr. HOLD time
PTI-MW06D-038		12:15	X						X			X			
PTI-MW06D-038		↓	X					X					X		Field Filtered
PTI-MW06D-038		↓	X			X								X	24 hr. HOLD time
PTI-MW07-038		13:45	X						X			X			
PTI-MW07-038		↓	X					X					X		Field Filtered
PTI-MW07-038		↓	X			X								X	24 hr. HOLD time

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	L Dybel	1-14-98	16:18	P Bautista	1-14-98	1618
2.	P Bautista	1-14-98	1830		1-14-98	1820
3.						

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
CDM		1-14-98	62537

Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page
		130227	Page 2 of 3

City	State	Zip Code	Site Contact	Lab Contact

Project Name	Carrier/Waybill Number
PTI	

Contract/Purchase Order/Quote No.

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	Analysis: 8260	CC Cu, Cd Cr+6, pH		Special Instructions/ Conditions of Receipt
PTI-MW04A-038	1-14-98	14:55	X						X			X			
PTI-MW04A-038		↓						X					X		Field filtered
PTI-MW04A-038		↓				X								X	24 hr. HOLD
PTI-MW04-038		16:05							X			X			
PTI-MW04-038		↓						X					X		Field filtered
PTI-MW04-038		↓				X								X	24 hr HOLD
PTI-MW35-038		9:20							X			X			
PTI MW35-038		↓						X					X		Field filtered
PTI-MW35-038		↓				X								X	24 hold
PTI-EB01-038		14:40							X			X			
PTI-EB01-038		↓						X					X		Field filtered
PTI-EB01-038	↓	↓	↓			X								X	24 hr HOLD

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
Y Dybel	1-14-98	16:18	P Bautista	1-14-98	1618
2. Relinquished By	Date	Time	2. Received By	Date	Time
P Bautista	1-14-98	1820		1-14-98	1820
3. Relinquished By	Date	Time	3. Received By	Date	Time

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
CDM		1-14-98	62538
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** 3 of 3
		130227	
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Project Name PTI	**Carrier/Waybill Number**		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		Analysis (Attach list if more space is needed): 8260	Special Instructions/ Conditions of Receipt
PTI-TB02-038	1-14-98	—	X							X				X	

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.	J Dybel	1-14-98	16:18	P Baptiste	1-14-98	1618
2.	P Baptiste	1-14-98	1820		1-14-98	1820
3.						

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Chain of Custody Record

Quanterra Environmental Services

QUA-4124-1

Client	Project Manager	Date	Chain Of Custody Number
Camp Dresser & McKee	Sharon Wallin	1-13-98	7124
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page**
18881 Von Karman Ave	714-752-5452	130200	1 of 1
City / State / Zip Code	**Site Contact**	**Lab Contact**	
Irvine / CA / 92612	Ed Vigil	Maryann V.	
Project Name	**Carrier/Waybill Number**		
Phibro-Tech Inc			
Contract/Purchase Order/Quote No.			
2279-11463-110.FLD			

Analysis (Attach list if more space is needed)

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	8260	Cu, Cd, Cr	Cr+6, pH	Special Instructions/ Conditions of Receipt
PTI-MW01S-038	1-13-98	14:05	X						X			X			
PTI-MW01S-038		↓	X					X					X		Field Filtered
PTI-MW01S-038		↓	X			X								X	24 hr. HOLD time
PTI-MW01D-038		14:50	X						X			X			
PTI-MW01D-038		↓	X					X					X		Field Filtered
PTI-MW01D-038		↓	X			X								X	24 hr. HOLD time
PTI-MW03-038		15:50	X						X			X			
PTI-MW03-038		↓	X					X					X		Field Filtered
PTI-MW03-038		↓	X			X								X	24 hr. HOLD time
PTI-TB01-038		—	X						X			X			

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal

☐ Return To Client ☒ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required

☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☒ Other Normal

QC Requirements (Specify)

1. Relinquished By	Date	Time	1. Received By	Date	Time
Leslie A. Dybel	1-13-98	16:55	PBautista	1-13-98	1655
2. Relinquished By	**Date**	**Time**	**2. Received By**	**Date**	**Time**
PBautista	1-13-98	1800		1-13-98	1800
3. Relinquished By	**Date**	**Time**	**3. Received By**	**Date**	**Time**

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Appendix D
Background Groundwater Concentrations

CITY OF SANTA FE SPRINGS

1996 ANNUAL WATER QUALITY REPORT

The City of Santa Fe Springs is pleased to provide the following Water Quality Report. Upon review, it should be obvious that water provided by the Santa Fe Springs Water Utility is safe, drinkable, and of good quality.

MONITORING PROGRAM

The City of Santa Fe Springs receives its water from two sources, the Metropolitan Water District (MWD) and local wells. Water from the MWD is imported from throughout the State and is regulated by the California Department of Health Services, and the Central Basin Municipal Water District (CBMWD) regulates groundwater. The City of Santa Fe Springs works with both agencies to test and monitor each source. Together, the MWD, CBMWD and City provide the safest water possible.

CITY OF WATER QUALITY REPORT

SAFETY STANDARDS

There are two types of standards that protect your water supply. Primary standards address contaminants that could affect our health. Secondary standards regulate chemicals that affect the aesthetic qualities of water, such as taste, odor and appearance. Regulations establish a Maximum Contaminant Level (MCL) for each. Santa Fe Springs sees to it that MCLs are met, and corrected if they are exceeded. Not all chemicals are regulated with MCLs, but many more chemicals are being added to the compliance list each year by the Department of Health Services and the U.S. Environmental Protection Agency. California also requires monitoring of unregulated chemicals.

Water treatment procedures have all but eliminated water-borne diseases. Media reports of cryptosporidium in water have been over exaggerated and there is little if any chance of it being present.

While the public is not at risk, cryptosporidium can prove life-threatening to people with compromised immune systems - such as chemotherapy patients, organ and bone marrow recipients or people infected with HIV or AIDS. As a precaution, people with such conditions should consult their doctor or health care provider to prevent infection from all potential sources. They may also boil their water for five minutes before consumption as a further precaution.

UNDERSTANDING THE WATER QUALITY REPORT

The information on the chart shows the results for various water quality analysis conducted during the year. When reading the list, you will note that Santa Fe Springs' water supply is of better quality than required by Federal and State standards.

This report is an important part of the City of Santa Fe Springs' ongoing water quality effort as required by the California Department of Health Services. If you have any questions about this information, please call 868-0511.

LEGEND

mg/l	=	MILLIGRAMS PER LITER (Parts per million)
ug/l	=	MICROGRAMS PER LITER (Parts per billion)
umhos/cm	=	MICROMHOS PER CENTIMETER
MCL	=	MAXIMUM CONTAMINANT LEVEL
MFL	=	MILLION FIBERS PER LITER (Longer than 10 um)
ND	=	NONE DETECTED
pCi/l	=	picoCuries PER LITER
NA	=	NOT ANALYZED
NR	=	NOT REQUIRED FOR COMPLIANCE PURPOSES
NC	=	NOT COLLECTED
W	=	MONITORING IS WAIVED (Based on vulnerability assessment, historic data and source susceptibility)

(a) Monitoring was completed for unregulated organics in addition to the regulated constituents listed. Results for all constituents were below detection levels unless otherwise noted.
(b) Fluoride results and MCL's are temperature dependent.
(c) Samples for this constituent were collected from points in the distribution system.
(d) The Metropolitan Water District of Southern California, which supplies the surface water, has developed a more accurate method to detect odors. This information is available upon request from the Metropolitan Water District.
(e) Action level based on sample results at customer tap.
(f) Secondary MCL indicated in parentheses.

CONSTITUENTS(a)	GROUNDWATER AVERAGE	GROUNDWATER RANGE	SURFACE WATER AVERAGE	SURFACE WATER RANGE	MCL (b)
GENERAL MINERAL - mg/l					
TOTAL HARDNESS	249	37-338	286	249-327	—
CALCIUM	72	15-99	69	60-80	—
MAGNESIUM	19	ND-35	28	24-32	—
SODIUM	75	39-136	97	86-112	—
POTASSIUM	3.1	1.4-4.2	4.5	3.9-5.1	—
TOTAL ALKALINITY (as CaCO3)	163	104-185	116	103-132	—
SULFATE	154	56-290	246	206-294	250-600 (f)
CHLORIDE	55	18-88	91	80-102	250-600 (f)
NITRATE (as NO3)	3.3	ND-12.0	.95	ND-1.63	45
NITRITE (as N)	ND	ND	ND	ND	1
FLUORIDE	0.47(b)	0.29-1.00	0.23	0.17-0.28	1.4-2.4
COPPER	0.13	ND-0.467	ND	ND	1 (e)
IRON	0.121	ND-0.525	ND	ND	0.3 (f)
MANGANESE	0.008	ND-0.031	ND	ND	0.05 (f)
ZINC	ND	ND	ND	ND	5 (f)
FOAMING AGENT (MBAS)	ND	ND	ND	ND	0.5 (f)
TOTAL DISSOLVED SOLIDS	500	250-739	617	541-715	500-1500(f)
GENERAL PHYSICAL					
pH (std unit)	8.0	7.9-8.5	8.04	8.00-8.08	6.5-8.5 (f)
SPECIFIC CONDUCTANCE (umhos/cm)	771	390-1130	991	896-1114	900-2200(f)
UNITS OF COLOR	ND (c)	ND-5	2.5	1.0-4.0	15 (f)
THRESHOLD ODOR NO. (TON)	1 (c)	1-2	(d)	(d)	3 (f)
TURBIDITY (ntu)	0.14(c)	0.10-0.90	0.08	0.06-0.10	5 (f)
RADIOLOGICAL - pCi/l					
GROSS ALPHA	1.6	ND-6.3	6.6	ND-11.7	15
URANIUM	5.3	4.0-6.0	4.6	3.3-5.7	20
GROSS BETA	NR	NR	7.3	1.2-11.2	50
INORGANICS - mg/l					
ANTIMONY	ND	ND	ND	ND	0.006
ARSENIC	ND	ND-0.002	0.002	ND-0.003	0.05
ASBESTOS	W	W	ND	ND	7 MFL
BARIUM	0.018	ND-0.110	0.12	0.11-0.13	1
BERYLLIUM	ND	ND	ND	ND	0.004
CADMIUM	ND	ND	ND	ND	0.005
CHROMIUM	ND	ND	ND	ND	0.05
CYANIDE	W	W	ND	ND	0.2
LEAD	ND	ND-0.006	ND	ND	0.015 (e)
MERCURY	ND	ND	ND	ND	0.002
NICKEL	ND	ND	0.004	0.003-0.008	0.1
SELENIUM	ND	ND	ND	ND	0.05
SILVER	ND	ND	ND	ND	0.1
THALLIUM	ND	ND	ND	ND	0.002
ALUMINUM	ND	ND	0.165	0.093-0.214	1 (0.2) (f)
ORGANICS - ug/l					
2, 4-D	ND	ND	ND	ND	70
2, 4, 5-TP SILVEX	W	W	NA	NA	50
ALACHLOR	W	W	ND	ND	2
ATRAZINE	ND	ND	ND	ND	3
SIMAZINE	ND	ND	ND	ND	4
BENTAZON	W	W	ND	ND	18
BENZO (a) pyrene	W	W	ND	ND	0.2
CARBARYL	ND	ND	NA	NA	
CARBOFURAN	W	W	ND	ND	18
CHLORDANE	ND	ND	ND	ND	0.1
DALAPON	W	W	ND	ND	200
DINOSEB	W	W	ND	ND	7
DIQUAT	ND	ND	ND	ND	20
Di(2-ethylhexyl)adipate (DEHA)	W	W	ND	ND	400
Di(2-ethylhexyl)phthalate (DEHP)	W	W	ND	ND	4
ETHYLENE DIBROMIDE (EDB)	W	W	ND	ND	0.05
1, 2, DIBROMO-3-CHLOROPROPANE (DBCP)	W	W	ND	ND	0.2
ENDOTHALL	W	W	ND	ND	100
ENDRIN	W	W	ND	ND	2
GLYPHOSATE	ND	ND	ND	ND	700
HEPTACHLOR	W	W	ND	ND	0.01
HEPTACHLOR EPOXIDE	W	W	ND	ND	0.01
HEXACHLOROBENZENE	W	W	ND	ND	50
HEXACHLOROCYCLOPENTADIENE	W	W	ND	ND	50
LINDANE	W	W	ND	ND	0.2
METHOXYCHLOR	W	W	ND	ND	40
MOLINATE	W	W	ND	ND	20
OXAMYL (VYDATE)	W	W	ND	ND	200
PENTACHLOROPHENOL	W	W	ND	ND	1
PICLORAM	W	W	ND	ND	500
POLYCHLORINATED BIPHENYLS (PCB's)	W	W	ND	ND	0.5
THIOBENCARB	W	W	ND	ND	70
TOXAPHENE	W	W	ND	ND	3
2,3,7,8-TCDD (Dioxin)	W	W	ND	ND	3xE-8
TRIHALOMETHANES, TOTAL - TTHMS (c)	37.4	ND-96.0	38.5	20.0-64.0	100
BENZENE	ND	ND	ND	ND	1
CARBON TETRACHLORIDE	ND	ND	ND	ND	0.5
DICHLOROMETHANE	ND	ND	ND	ND	5
MONOCHLOROBENZENE	ND	ND	ND	ND	30
1,4-DICHLOROBENZENE	ND	ND	ND	ND	5
1,1-DICHLOROETHANE - 11DCA	ND	ND	ND	ND	5
1,2-DICHLOROETHANE - 12DCA	ND	ND	ND	ND	0.5
1,1-DICHLOROETHENE - 11DCE	ND	ND	ND	ND	6
cis-1,2-DICHLOROETHENE	ND	ND	ND	ND	6
trans-1,2-DICHLOROETHENE	ND	ND	ND	ND	10
1,2-DICHLOROPROPANE	ND	ND	ND	ND	5
1,3-DICHLOROPROPENE	ND	ND	ND	ND	0.5
ETHYLBENZENE	ND	ND	ND	ND	700
FLUOROTRICHLOROMETHANE - FREON 11	ND	ND	ND	ND	150
STYRENE	ND	ND	ND	ND	100
1,1,2,2-TETRACHLOROETHANE	ND	ND	ND	ND	1
TETRACHLOROETHENE - PCE	1.1	ND-4.8	ND	ND	5
1,2,4-TRICHLOROBENZENE	ND	ND	ND	ND	70
TOLUENE	ND	ND	ND	ND	150
1,1,1-TRICHLOROETHANE -1,1,1TCA	ND	ND	ND	ND	200
1,1,2-TRICHLOROETHANE -1,1,2TCA	ND	ND	ND	ND	5
TRICHLOROETHENE - TCE	0.3	ND-1.2	ND	ND	5
TRICHLOROTRIFLUOROETHANE - FREON 113	ND	ND	ND	ND	1,200
VINYL CHLORIDE	ND	ND	ND	ND	0.5
XYLENES, TOTAL (m, p & o)	ND	ND	ND	ND	1750
COLIFORM BACTERIA (c)					
COLIFORM BACTERIA PA % POSITIVE	0	0	NA	NA	5
COLIFORM BACTERIA MF CFU/100mL	NC	NC	0.12	0-1.1	1
NO. OF ACUTE VIOLATIONS	0	0	0	0	0

Appendix E
Statistical Analysis

Appendix E-1
Calculation of Upper Tolerance Limits for Background

SUMMARY OF UPPER TOLERANCE LEVEL CALCULATIONS
Quarterly Background Data: January 1989 to January 1998
Southern California Chemical

POISSON DISTRIBUTED UPPER TOLERANCE LEVEL

COMPOUND	Hexa Chromium	Total Chromium	Cadmium	Copper	Benzene	Toluene	Ethyl Benzene	Total Xylenes	Trichloroethene
Percent Detected	2.7	10.8	2.7	21.6	2.7	10.8	32.4	37.8	NOT
Sample number(n)	37	37	37	37	37	37	37	37	CALC.
Tn	0.4855	0.3681	0.1059	0.5325	11.1550	22.6050	35.7050	69.4550	
2Tn+2	2.97	2.74	2.21	3.07	24.31	47.21	73.41	140.91	
Chi Squared @95% of dis	7.80	7.38	6.41	7.96	37.12	64.73	94.19	164.73	
lamda Tn	0.105	0.100	0.087	0.108	0.502	0.875	1.273	2.226	
Two time Lamda Tn	0.211	0.199	0.173	0.215	1.003	1.749	2.546	4.452	
Beta cov. @95%, deg fr.	2.52	2.47	2.36	2.54	4.71	6.29	7.73	10.62	
k, from 2k+2 deg fr.	0.26	0.24	0.18	0.27	1.35	2.15	2.86	4.31	

AITCHISON ADJUSTMENT AND CALCULATION OF UPPER TOLERANCE LEVELS

Number of ND(d)	NOT	33	NOT	29	NOT	33	25	23	NO ADJ. REQ.
Number of values(n)	CALC.	37	CALC.	37	CALC.	37	37	37	
Mean of det values		0.0485		0.028		1.800	1.400	4.925	
STD of det values		0.040		0.008		0.361	0.265	0.907	
Atch. Adj. mean/mean(1)		0.005		0.006		0.195	0.454	1.864	12.235
Atch. Adj. std./std. (1)		0.019		0.012		0.576	0.680	2.482	5.661
K for Tolerance Limit		2.292		2.292		2.292	2.292	2.292	1.000
Adjusted Tol. Limit		0.049		0.034		1.515	2.013	7.552	
Unadjusted Tol. Limit									17.896

(1) Unadjusted mean and std. used to compute upper tolerance level for TCE

Appendix E-2
Nonparametric ANOVA Results

3.94

Non parametric

BY PARAMID$

>KRUSKAL VALUE * WELL$

WED 3/04/98 1:19:54 AM O:\2279-111\JAN98\1-11.SYS

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = BEN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1584.500
MW-1S	37	1190.500

MANN-WHITNEY U TEST STATISTIC = 881.500
PROBABILITY IS 0.016
CHI-SQUARE APPROXIMATION = 5.751 WITH 1 DF

R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1353.500
MW-1S	37	1421.500

MANN-WHITNEY U TEST STATISTIC = 650.500
PROBABILITY IS 0.625
CHI-SQUARE APPROXIMATION = 0.240 WITH 1 DF

A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1384.000
MW-1S	37	1391.000

MANN-WHITNEY U TEST STATISTIC = 681.000
PROBABILITY IS 0.963
CHI-SQUARE APPROXIMATION = 0.002 WITH 1 DF

A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	2006.000
MW-1S	37	769.000

MANN-WHITNEY U TEST STATISTIC = 1303.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 45.922 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1371.000
MW-1S	37	1404.000

MANN-WHITNEY U TEST STATISTIC = 668.000
PROBABILITY IS 0.788
CHI-SQUARE APPROXIMATION = 0.072 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1998.000
MW-1S	37	777.000

MANN-WHITNEY U TEST STATISTIC = 1295.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 43.579 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:

PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1381.500
MW-1S	37	1393.500

MANN-WHITNEY U TEST STATISTIC = 678.500
PROBABILITY IS 0.931
CHI-SQUARE APPROXIMATION = 0.007 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 72 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	36	1742.000
MW-1S	36	886.000

MANN-WHITNEY U TEST STATISTIC = 1076.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 25.726 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-11	37	1825.500
MW-1S	37	949.500

MANN-WHITNEY U TEST STATISTIC = 1122.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 23.118 WITH 1 DF R

>

BY PARAMID$

KRUSKAL VALUE * WELL$

WED 3/04/98 1:25:11 AM O:\2279-111\JAN98\1-14S.SYS

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = BEN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1093.000
MW-1S	37	1118.000

MANN-WHITNEY U TEST STATISTIC = 658.000
PROBABILITY IS 0.037
CHI-SQUARE APPROXIMATION = 4.362 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	989.500
MW-1S	37	1221.500

MANN-WHITNEY U TEST STATISTIC = 554.500
PROBABILITY IS 0.738
CHI-SQUARE APPROXIMATION = 0.112 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1168.500
MW-1S	37	1042.500

MANN-WHITNEY U TEST STATISTIC = 733.500
PROBABILITY IS 0.003

HI-SQUARE APPROXIMATION = 8.728 WITH 1 DF R

HE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1287.000
MW-1S	37	924.000

ANN-WHITNEY U TEST STATISTIC = 852.000
PROBABILITY IS 0.000
HI-SQUARE APPROXIMATION = 17.844 WITH 1 DF R

HE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1206.500
MW-1S	37	1004.500

ANN-WHITNEY U TEST STATISTIC = 771.500
ROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 12.747 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1480.000
MW-1S	37	731.000

ANN-WHITNEY U TEST STATISTIC = 1045.000
ROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 43.190 WITH 1 DF

'HE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCR

'RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1407.500
MW-1S	37	803.500

IANN-WHITNEY U TEST STATISTIC = 972.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 36.757 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

'RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 64 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	28	1038.500
MW-1S	36	1041.500

IANN-WHITNEY U TEST STATISTIC = 632.500
'ROBABILITY IS 0.031
CHI-SQUARE APPROXIMATION = 4.637 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

'RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 66 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-14S	29	1089.500
MW-1S	37	1121.500

MANN-WHITNEY U TEST STATISTIC = 654.500
'ROBABILITY IS 0.105
CHI-SQUARE APPROXIMATION = 2.623 WITH 1 DF A

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: BY PARAMID$

>KRUSKAL VALUE * WELL$

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 'HE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = BEN

 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  67 CASES
   DEPENDENT VARIABLE IS    VALUE
   GROUPING VARIABLE IS     WELL$

    GROUP       COUNT   RANK SUM

   MW-15S         30    1018.000
   MW-1S          37    1260.000


 MANN-WHITNEY U TEST STATISTIC =     553.000
 PROBABILITY IS       0.966
 CHI-SQUARE APPROXIMATION =       0.002 WITH    1 DF       A

 'HE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = CD

 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  67 CASES
   DEPENDENT VARIABLE IS    VALUE
   GROUPING VARIABLE IS     WELL$

    GROUP       COUNT   RANK SUM

   MW-15S         30    1092.000
   MW-1S          37    1186.000

 MANN-WHITNEY U TEST STATISTIC =     627.000
 PROBABILITY IS       0.201
 CHI-SQUARE APPROXIMATION =       1.633 WITH    1 DF       A

 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = CU

 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  67 CASES
   DEPENDENT VARIABLE IS    VALUE
   GROUPING VARIABLE IS     WELL$

    GROUP       COUNT   RANK SUM

   MW-15S         30     974.000
   MW-1S          37    1304.000

 MANN-WHITNEY U TEST STATISTIC =     509.000
 PROBABILITY IS       0.427
 CHI-SQUARE APPROXIMATION =       0.632 WITH    1 DF       A
```

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 67 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-15S	30	1161.500
MW-1S	37	1116.500

MANN-WHITNEY U TEST STATISTIC = 696.500
PROBABILITY IS 0.057
CHI-SQUARE APPROXIMATION = 3.618 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 67 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-15S	30	1020.000
MW-1S	37	1258.000

MANN-WHITNEY U TEST STATISTIC = 555.000
PROBABILITY IS 1.000
CHI-SQUARE APPROXIMATION = 0.000 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 67 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-15S	30	666.500
MW-1S	37	1611.500

MANN-WHITNEY U TEST STATISTIC = 201.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 19.887 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:

PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 67 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-15S	30	1096.500
MW-1S	37	1181.500

MANN-WHITNEY U TEST STATISTIC = 631.500
PROBABILITY IS 0.197
CHI-SQUARE APPROXIMATION = 1.665 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 65 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-15S	29	1075.500
MW-1S	36	1069.500

MANN-WHITNEY U TEST STATISTIC = 640.500
ROBABILITY IS 0.063
HI-SQUARE APPROXIMATION = 3.446 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 67 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-15S	30	1067.500
MW-1S	37	1210.500

MANN-WHITNEY U TEST STATISTIC = 602.500
PROBABILITY IS 0.523
HI-SQUARE APPROXIMATION = 0.407 WITH 1 DF A

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BY PARAMID$

>KRUSKAL VALUE * WELL$


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THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = BEN


KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  61 CASES
  DEPENDENT VARIABLE IS    VALUE
  GROUPING VARIABLE IS     WELL$

    GROUP       COUNT    RANK SUM

  MW-16           24      957.000
  MW-1S           37      934.000


MANN-WHITNEY U TEST STATISTIC =     657.000
PROBABILITY IS       0.000
CHI-SQUARE APPROXIMATION =      14.686 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  61 CASES
  DEPENDENT VARIABLE IS    VALUE
  GROUPING VARIABLE IS     WELL$

    GROUP       COUNT    RANK SUM

  MW-16           24      739.500
  MW-1S           37     1151.500


MANN-WHITNEY U TEST STATISTIC =     439.500
PROBABILITY IS       0.914
CHI-SQUARE APPROXIMATION =       0.012 WITH    1 DF

THE FOLLOWING RESULTS ARE FOR:
          PARAMID$    = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  61 CASES
  DEPENDENT VARIABLE IS    VALUE
  GROUPING VARIABLE IS     WELL$

    GROUP       COUNT    RANK SUM

  MW-16           24      712.000
  MW-1S           37     1179.000


MANN-WHITNEY U TEST STATISTIC =     412.000
PROBABILITY IS       0.509
CHI-SQUARE APPROXIMATION =       0.435 WITH    1 DF
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THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 61 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-16	24	1084.500
MW-1S	37	806.500

MANN-WHITNEY U TEST STATISTIC = 784.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 26.915 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 61 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-16	24	714.000
MW-1S	37	1177.000

MANN-WHITNEY U TEST STATISTIC = 414.000
PROBABILITY IS 0.492
CHI-SQUARE APPROXIMATION = 0.473 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 61 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-16	24	1165.500
MW-1S	37	725.500

MANN-WHITNEY U TEST STATISTIC = 865.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 38.752 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:

PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 61 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-16	24	730.000
MW-1S	37	1161.000

MANN-WHITNEY U TEST STATISTIC = 430.000
PROBABILITY IS 0.725
HI-SQUARE APPROXIMATION = 0.124 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 59 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-16	23	939.500
MW-1S	36	830.500

MANN-WHITNEY U TEST STATISTIC = 663.500
PROBABILITY IS 0.000
HI-SQUARE APPROXIMATION = 18.600 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 61 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-16	24	1007.000
MW-1S	37	884.000

MANN-WHITNEY U TEST STATISTIC = 707.000
PROBABILITY IS 0.000
HI-SQUARE APPROXIMATION = 15.933 WITH 1 DF R

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: BY PARAMID$

>KRUSKAL VALUE * WELL$


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 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
   DEPENDENT VARIABLE IS     VALUE
   GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

   MW-1S           37     1208.000
   MW-3            37     1567.000


  MANN-WHITNEY U TEST STATISTIC =      505.000
  PROBABILITY IS        0.011
 CHI-SQUARE APPROXIMATION =        6.389 WITH     1 DF        R


 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
   DEPENDENT VARIABLE IS     VALUE
   GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

   MW-1S           37     1387.500
   MW-3            37     1387.500


  MANN-WHITNEY U TEST STATISTIC =      684.500
  PROBABILITY IS        1.000
 CHI-SQUARE APPROXIMATION =        0.000 WITH     1 DF        N


 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
   DEPENDENT VARIABLE IS     VALUE
   GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

   MW-1S           37     1428.000
   MW-3            37     1347.000


 MANN-WHITNEY U TEST STATISTIC =      725.000
  PROBABILITY IS        0.533
 CHI-SQUARE APPROXIMATION =        0.389 WITH     1 DF        A
```

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1104.000
MW-3	37	1671.000

MANN-WHITNEY U TEST STATISTIC = 401.000
PROBABILITY IS 0.001
CHI-SQUARE APPROXIMATION = 10.409 WITH 1 DF

R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1370.500
MW-3	37	1404.500

MANN-WHITNEY U TEST STATISTIC = 667.500
PROBABILITY IS 0.793
CHI-SQUARE APPROXIMATION = 0.069 WITH 1 DF

A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	852.000
MW-3	37	1923.000

MANN-WHITNEY U TEST STATISTIC = 149.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 33.549 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:

PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1353.000
MW-3	37	1422.000

MANN-WHITNEY U TEST STATISTIC = 650.000
PROBABILITY IS 0.585
CHI-SQUARE APPROXIMATION = 0.298 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 72 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	36	1079.000
MW-3	36	1549.000

MANN-WHITNEY U TEST STATISTIC = 413.000
PROBABILITY IS 0.001
CHI-SQUARE APPROXIMATION = 10.230 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1178.000
MW-3	37	1597.000

MANN-WHITNEY U TEST STATISTIC = 475.000
PROBABILITY IS 0.017
CHI-SQUARE APPROXIMATION = 5.681 WITH 1 DF R

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>BY PARAMID$

:RUSKAL VALUE * WELL$

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THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = BEN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	922.500
MW-4	37	1852.500

MANN-WHITNEY U TEST STATISTIC = 219.500
ROBABILITY IS 0.000
HI-SQUARE APPROXIMATION = 30.482 WITH 1 DF

R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	722.500
MW-4	37	2052.500

MANN-WHITNEY U TEST STATISTIC = 19.500
PROBABILITY IS 0.000
HI-SQUARE APPROXIMATION = 55.393 WITH 1 DF

R

HE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CU

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1297.500
MW-4	37	1477.500

ANN-WHITNEY U TEST STATISTIC = 594.500

PROBABILITY IS 0.235
CHI-SQUARE APPROXIMATION = 1.407 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	801.000
MW-4	37	1974.000

MANN-WHITNEY U TEST STATISTIC = 98.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 41.631 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	703.000
MW-4	37	2072.000

MANN-WHITNEY U TEST STATISTIC = 0.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 58.673 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	704.000
MW-4	37	2071.000

MANN-WHITNEY U TEST STATISTIC = 1.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 54.644 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	703.000
MW-4	37	2072.000

MANN-WHITNEY U TEST STATISTIC = 0.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 59.102 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 72 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	36	816.000
MW-4	36	1812.000

MANN-WHITNEY U TEST STATISTIC = 150.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 35.594 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	761.000
MW-4	37	2014.000

ANN-WHITNEY U TEST STATISTIC = 58.000
ROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 47.112 WITH 1 DF R

BY PARAMID$

KRUSKAL VALUE * WELL$

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THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = BEN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1285.500
MW-6B	33	1199.500

MANN-WHITNEY U TEST STATISTIC = 582.500
PROBABILITY IS 0.627
CHI-SQUARE APPROXIMATION = 0.236 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CD

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1276.500
MW-6B	33	1208.500

MANN-WHITNEY U TEST STATISTIC = 573.500
PROBABILITY IS 0.532
CHI-SQUARE APPROXIMATION = 0.391 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1380.000
MW-6B	33	1105.000

MANN-WHITNEY U TEST STATISTIC = 677.000
PROBABILITY IS 0.249

CHI-SQUARE APPROXIMATION = 1.331 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1193.000
MW-6B	33	1292.000

MANN-WHITNEY U TEST STATISTIC = 490.000
PROBABILITY IS 0.130
CHI-SQUARE APPROXIMATION = 2.298 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1330.000
MW-6B	33	1155.000

MANN-WHITNEY U TEST STATISTIC = 627.000
PROBABILITY IS 0.774
CHI-SQUARE APPROXIMATION = 0.082 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1435.500
MW-6B	33	1049.500

MANN-WHITNEY U TEST STATISTIC = 732.500
PROBABILITY IS 0.151
CHI-SQUARE APPROXIMATION = 2.062 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1163.000
MW-6B	33	1322.000

MANN-WHITNEY U TEST STATISTIC = 460.000
PROBABILITY IS 0.024
CHI-SQUARE APPROXIMATION = 5.117 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 68 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	36	1109.500
MW-6B	32	1236.500

MANN-WHITNEY U TEST STATISTIC = 443.500
PROBABILITY IS 0.065
CHI-SQUARE APPROXIMATION = 3.399 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 70 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1223.000
MW-6B	33	1262.000

MANN-WHITNEY U TEST STATISTIC = 520.000
PROBABILITY IS 0.252
CHI-SQUARE APPROXIMATION = 1.312 WITH 1 DF A

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BY PARAMID$

>KRUSKAL VALUE * WELL$


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 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = BEN


 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
   DEPENDENT VARIABLE IS     VALUE
   GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

   MW-1S           37     1127.500
   MW-7            37     1647.500


 MANN-WHITNEY U TEST STATISTIC =      424.500
 PROBABILITY IS        0.001
 CHI-SQUARE APPROXIMATION =       11.437 WITH     1 DF        R


 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CD


 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
   DEPENDENT VARIABLE IS     VALUE
   GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

   MW-1S           37     1370.500
   MW-7            37     1404.500


 MANN-WHITNEY U TEST STATISTIC =      667.500
 PROBABILITY IS        0.793
 CHI-SQUARE APPROXIMATION =        0.069 WITH     1 DF        A


 THE FOLLOWING RESULTS ARE FOR:
          PARAMID$     = CU


 KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR  74 CASES
   DEPENDENT VARIABLE IS     VALUE
   GROUPING VARIABLE IS      WELL$

    GROUP       COUNT    RANK SUM

   MW-1S           37     1244.500
   MW-7            37     1530.500


 MANN-WHITNEY U TEST STATISTIC =      541.500
 PROBABILITY IS        0.070
 CHI-SQUARE APPROXIMATION =        3.287 WITH     1 DF        A
```

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1126.500
MW-7	37	1648.500

MANN-WHITNEY U TEST STATISTIC = 423.500
PROBABILITY IS 0.003
CHI-SQUARE APPROXIMATION = 8.907 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1369.000
MW-7	37	1406.000

MANN-WHITNEY U TEST STATISTIC = 666.000
PROBABILITY IS 0.776
CHI-SQUARE APPROXIMATION = 0.081 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	747.500
MW-7	37	2027.500

MANN-WHITNEY U TEST STATISTIC = 44.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 47.901 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:

PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1303.500
MW-7	37	1471.500

MANN-WHITNEY U TEST STATISTIC = 600.500
PROBABILITY IS 0.218
CHI-SQUARE APPROXIMATION = 1.519 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 72 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	36	1128.000
MW-7	36	1500.000

MANN-WHITNEY U TEST STATISTIC = 462.000
PROBABILITY IS 0.009
CHI-SQUARE APPROXIMATION = 6.809 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1289.000
MW-7	37	1486.000

MANN-WHITNEY U TEST STATISTIC = 586.000
PROBABILITY IS 0.252
CHI-SQUARE APPROXIMATION = 1.312 WITH 1 DF A

D 3/04/98 1:44:06 AM O:\2279-111\JAN98\1-9.SYS

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = BEN

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	930.500
MW-9	37	1844.500

ANN-WHITNEY U TEST STATISTIC = 227.500
ROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 28.266 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CD

RUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1370.500
MW-9	37	1404.500

MANN-WHITNEY U TEST STATISTIC = 667.500
ROBABILITY IS 0.793
HI-SQUARE APPROXIMATION = 0.069 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = CU

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1461.000
MW-9	37	1314.000

MANN-WHITNEY U TEST STATISTIC = 758.000
ROBABILITY IS 0.258
HI-SQUARE APPROXIMATION = 1.280 WITH 1 DF A

HE FOLLOWING RESULTS ARE FOR:

PARAMID$ = EBN

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	869.500
MW-9	37	1905.500

MANN-WHITNEY U TEST STATISTIC = 166.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 32.629 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = HCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1260.500
MW-9	37	1514.500

MANN-WHITNEY U TEST STATISTIC = 557.500
PROBABILITY IS 0.074
CHI-SQUARE APPROXIMATION = 3.202 WITH 1 DF A

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCE

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	712.500
MW-9	37	2062.500

MANN-WHITNEY U TEST STATISTIC = 9.500
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 53.275 WITH 1 DF

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TCR

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES

DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	1222.500
MW-9	37	1552.500

MANN-WHITNEY U TEST STATISTIC = 519.500
PROBABILITY IS 0.023
CHI-SQUARE APPROXIMATION = 5.204 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TOL

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 72 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	36	851.000
MW-9	36	1777.000

MANN-WHITNEY U TEST STATISTIC = 185.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 30.731 WITH 1 DF R

THE FOLLOWING RESULTS ARE FOR:
PARAMID$ = TX

KRUSKAL-WALLIS ONE-WAY ANALYSIS OF VARIANCE FOR 74 CASES
DEPENDENT VARIABLE IS VALUE
GROUPING VARIABLE IS WELL$

GROUP	COUNT	RANK SUM
MW-1S	37	928.000
MW-9	37	1847.000

MANN-WHITNEY U TEST STATISTIC = 225.000
PROBABILITY IS 0.000
CHI-SQUARE APPROXIMATION = 26.098 WITH 1 DF R

Appendix E-3
Parametric ANOVA Results

PARAMETRIC ANOVA

```
FRI 3/06/98 2:50:54 AM   O:\2279-111\JAN98\1-11.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 JELL$
  MW-11         MW-1S


 DEP VAR: HDVALUE       N:       74  MULTIPLE R: 0.580  SQUARED MULTIPLE R: 0.336

                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES    DF  MEAN-SQUARE      F-RATIO        P

 JELL$             446355.511     1   446355.511       36.431       0.000

 ERROR             882139.390    72    12251.936

 LEAST SQUARES MEANS.                                                    R

                                      LS MEAN           SE       N
       WELL$    =MW-11                168.108        18.197     37

       WELL$    =MW-1S                 12.778        18.197     37


>PRINT=SHORT

: CATEGORY WELL$
>COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
: ESTIMATE

] RI 3/06/98 2:51:08 AM   O:\2279-111\JAN98\1-11.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 WELL$
  MW-11         MW-1S

     2 CASES DELETED DUE TO MISSING DATA.


 DEP VAR:HDLNVALU       N:       72  MULTIPLE R: 0.677  SQUARED MULTIPLE R: 0.458

                          ANALYSIS OF VARIANCE

  SOURCE        SUM-OF-SQUARES    DF  MEAN-SQUARE      F-RATIO        P

 WELL$                  75.469     1        75.469       59.087       0.000     R

 ERROR                  89.408    70         1.277


 LEAST SQUARES MEANS.
```

		LS MEAN	SE	N
WELL$	=MW-11	4.494	0.188	36
WELL$	=MW-1S	2.447	0.188	36

RI 3/06/98 2:25:34 AM O:\2279-111\JAN98\1-14S.SYS

LEVELS ENCOUNTERED DURING PROCESSING ARE:

WELL$

MW-14S MW-1S

2 CASES DELETED DUE TO MISSING DATA.

DEP VAR:HDLNVALU N: 64 MULTIPLE R: 0.786 SQUARED MULTIPLE R: 0.618

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
WELL$	28.739	1	28.739	100.119	0.000
ERROR	17.797	62	0.287		

R

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-14S	3.797	0.101	28
WELL$	=MW-1S	2.447	0.089	36

```
>CATEGORY WELL$
>COVAR
>NOVA HDVALUE
>PRINT=MEDIUM
>ESTIMATE


FRI 3/06/98 2:29:04 AM    O:\2279-111\JAN98\1-15S.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 WELL$
  MW-15S        MW-1S


 DEP VAR: HDVALUE       N:       67  MULTIPLE R: 0.468  SQUARED MULTIPLE R: 0.219

                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 WELL$                 617.484    1       617.484       18.254        0.000

 ERROR                2198.721   65        33.826


 LEAST SQUARES MEANS.

                                          LS MEAN           SE       N

       WELL$    =MW-15S                    6.673        1.062      30

       WELL$    =MW-1S                    12.778        0.956      37


>PRINT=SHORT

>CATEGORY WELL$
>COVAR
>NOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE


FRI 3/06/98 2:29:16 AM    O:\2279-111\JAN98\1-15S.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 WELL$
  MW-15S        MW-1S

     2 CASES DELETED DUE TO MISSING DATA.


 DEP VAR:HDLNVALU       N:       65  MULTIPLE R: 0.557  SQUARED MULTIPLE R: 0.310

                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 WELL$                  12.544    1        12.544       28.334        0.000
```

ERROR	27.891	63	0.443

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-15S	1.563	0.124	29
WELL$	=MW-1S	2.447	0.111	36

```
SELECT PARAMID$ ="TCE"
>CATEGORY WELL$
>COVAR
ANOVA HDVALUE
>PRINT=MEDIUM
>ESTIMATE

FRI 3/06/98 2:30:32 AM    O:\2279-111\JAN98\1-16.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
  MW-16          MW-1S


DEP VAR: HDVALUE       N:       61  MULTIPLE R: 0.725  SQUARED MULTIPLE R: 0.526

                        ANALYSIS OF VARIANCE

SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

WELL$              16513.006    1    16513.006       65.439        0.000
ERROR              14888.281   59      252.344


LEAST SQUARES MEANS.

                                        LS MEAN           SE       N
      WELL$    =MW-16                   46.458        3.243      24

      WELL$    =MW-1S                   12.778        2.612      37


>PRINT=SHORT
>CATEGORY WELL$
>COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE

FRI 3/06/98 2:30:42 AM    O:\2279-111\JAN98\1-16.SYS
LEVELS ENCOUNTERED DURING PROCESSING ARE:
WELL$
  MW-16          MW-1S

    2 CASES DELETED DUE TO MISSING DATA.


DEP VAR:HDLNVALU       N:       59  MULTIPLE R: 0.781  SQUARED MULTIPLE R: 0.611

                        ANALYSIS OF VARIANCE

SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P
```

VELL$	22.886	1	22.886	89.432	0.000
ERROR	14.587	57	0.256		

R

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-16	3.724	0.105	23
WELL$	=MW-1S	2.447	0.084	36

```
:ATEGORY WELL$
>COVAR
: NOVA HDVALUE
: RINT=MEDIUM
>ESTIMATE


RI 3/06/98 2:32:13 AM   O:\2279-111\JAN98\1-3.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 ELL$
 MW-1S          MW-3


 DEP VAR: HDVALUE       N:       74  MULTIPLE R: 0.577  SQUARED MULTIPLE R: 0.333

                          ANALYSIS OF VARIANCE

 OURCE          SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 WELL$               26060.644    1    26060.644       35.933        0.000

 RROR                52218.998   72      725.264


 EAST SQUARES MEANS.

                                        LS MEAN           SE       N
       WELL$    =MW-1S                  12.778         4.427      37

       WELL$    =MW-3                   50.311         4.427      37


> RINT=SHORT

>CATEGORY WELL$
> OVAR
> NOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE

FRI 3/06/98 2:32:23 AM   O:\2279-111\JAN98\1-3.SYS
  EVELS ENCOUNTERED DURING PROCESSING ARE:
 ELL$
  MW-1S          MW-3

     2 CASES DELETED DUE TO MISSING DATA.


 EP VAR:HDLNVALU       N:       72  MULTIPLE R: 0.669  SQUARED MULTIPLE R: 0.448

                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 ELL$                  25.456    1       25.456       56.863        0.000
```

ERROR	31.337	70	0.448

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-1S	2.447	0.112	36
WELL$	=MW-3	3.636	0.112	36

FRI 3/06/98 2:33:19 AM O:\2279-111\JAN98\1-4.SYS

LEVELS ENCOUNTERED DURING PROCESSING ARE:

WELL$

MW-1S MW-4

DEP VAR: HDVALUE N: 74 MULTIPLE R: 0.849 SQUARED MULTIPLE R: 0.721

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
WELL$	673409.522	1	673409.522	185.609	0.000
ERROR	261223.404	72	3628.103		

R

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-1S	12.778	9.902	37
WELL$	=MW-4	203.568	9.902	37

>PRINT=SHORT

>CATEGORY WELL$
>COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE

FRI 3/06/98 2:33:29 AM O:\2279-111\JAN98\1-4.SYS

LEVELS ENCOUNTERED DURING PROCESSING ARE:

WELL$

MW-1S MW-4

2 CASES DELETED DUE TO MISSING DATA.

DEP VAR:HDLNVALU N: 72 MULTIPLE R: 0.939 SQUARED MULTIPLE R: 0.881

ANALYSIS OF VARIANCE

SOURCE	SUM-OF-SQUARES	DF	MEAN-SQUARE	F-RATIO	P
WELL$	137.049	1	137.049	517.362	0.000
ERROR	18.543	70	0.265		

R

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-1S	2.447	0.086	36
WELL$	=MW-4	5.206	0.086	36

```
>ATEGORY WELL$
>COVAR
: NOVA HDVALUE
: RINT=MEDIUM
>ESTIMATE


RI 3/06/98 2:52:05 AM   O:\2279-111\JAN98\1-6B.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 ELL$
 MW-1S          MW-6B


 DEP VAR: HDVALUE       N:       70  MULTIPLE R: 0.164  SQUARED MULTIPLE R: 0.027

                          ANALYSIS OF VARIANCE

 OURCE          SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 WELL$                 373.057    1       373.057        1.885        0.174

 RROR                13460.592   68       197.950


 EAST SQUARES MEANS.

                                        LS MEAN           SE       N
      WELL$    =MW-1S                   12.778         2.313      37

      WELL$    =MW-6B                   17.403         2.449      33


> RINT=SHORT

>CATEGORY WELL$
> OVAR
> NOVA HDLNVALU
>PRINT=MEDIUM
>STIMATE


FRI 3/06/98 2:52:14 AM   O:\2279-111\JAN98\1-6B.SYS
  EVELS ENCOUNTERED DURING PROCESSING ARE:
 ELL$
  MW-1S          MW-6B

     2 CASES DELETED DUE TO MISSING DATA.


 EP VAR:HDLNVALU       N:       68  MULTIPLE R: 0.145  SQUARED MULTIPLE R: 0.021


                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 ELL$                    1.127    1         1.127        1.424        0.237
```

ERROR	52.255	66	0.792

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-1S	2.447	0.148	36
WELL$	=MW-6B	2.189	0.157	32

```
>CATEGORY WELL$
>COVAR
>ANOVA HDVALUE
>PRINT=MEDIUM
>ESTIMATE


FRI 3/06/98 2:53:34 AM   O:\2279-111\JAN98\1-7.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 WELL$
  MW-1S          MW-7


 DEP VAR: HDVALUE       N:       74  MULTIPLE R: 0.699  SQUARED MULTIPLE R: 0.488


                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 WELL$               51437.851    1    51437.851       68.666        0.000

 ERROR               53935.010   72      749.097


 LEAST SQUARES MEANS.

                                        LS MEAN           SE       N
       WELL$    =MW-1S                  12.778         4.500      37

       WELL$    =MW-7                   65.508         4.500      37


> PRINT=SHORT

>CATEGORY WELL$
>COVAR
>ANOVA HDLNVALU
>PRINT=MEDIUM
>ESTIMATE


FRI 3/06/98 2:53:48 AM   O:\2279-111\JAN98\1-7.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
 WELL$
  MW-1S          MW-7

     2 CASES DELETED DUE TO MISSING DATA.


 DEP VAR:HDLNVALU       N:       72  MULTIPLE R: 0.757  SQUARED MULTIPLE R: 0.573


                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES   DF  MEAN-SQUARE      F-RATIO        P

 WELL$                 40.846    1       40.846       93.992        0.000
```

ERROR	30.420	70	0.435	

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-1S	2.447	0.110	36
WELL$	=MW-7	3.953	0.110	36

PRINT=SHORT

```
>ATEGORY WELL$
>COVAR
: NOVA HDVALUE
>RINT=MEDIUM
>ESTIMATE


FRI 3/06/98 2:54:43 AM    O:\2279-111\JAN98\1-9.SYS
 LEVELS ENCOUNTERED DURING PROCESSING ARE:
  ELL$
 MW-1S          MW-9


 DEP VAR: HDVALUE       N:       74  MULTIPLE R: 0.614  SQUARED MULTIPLE R: 0.377

                          ANALYSIS OF VARIANCE

 OURCE          SUM-OF-SQUARES    DF  MEAN-SQUARE      F-RATIO        P

 WELL$            1624509.211     1  1624509.211       43.509        0.000

 RROR             2688257.890    72    37336.915


 LEAST SQUARES MEANS.

                                        LS MEAN           SE       N
       WELL$    =MW-1S                  12.778         31.766      37

       WELL$    =MW-9                  309.108         31.766      37


> RINT=SHORT

>CATEGORY WELL$
> OVAR
>NOVA HDLNVALU
>PRINT=MEDIUM
>STIMATE

FRI 3/06/98 2:54:52 AM    O:\2279-111\JAN98\1-9.SYS
  EVELS ENCOUNTERED DURING PROCESSING ARE:
 ELL$
  MW-1S          MW-9

     2 CASES DELETED DUE TO MISSING DATA.


 EP VAR:HDLNVALU       N:       72  MULTIPLE R: 0.834  SQUARED MULTIPLE R: 0.696

                          ANALYSIS OF VARIANCE

 SOURCE         SUM-OF-SQUARES    DF  MEAN-SQUARE      F-RATIO        P

 ELL$               135.015     1      135.015       159.907        0.000
```

ERROR	59.103	70	0.844

LEAST SQUARES MEANS.

		LS MEAN	SE	N
WELL$	=MW-1S	2.447	0.153	36
WELL$	=MW-9	5.185	0.153	36